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PHASE II ARCHAEOLOGICAL TEST EXCAVATIONS
AT 23CE324, 23CE235, and 23CE252
BELOW STOCKTON DAM ON THE SAC RIVER,
CEDAR COUNTY, MISSOURI: 1981

Project: CAR-91

With a discussion of test excavations
at sites 23CE240 and 23CE241

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Downstream Stockton

The Corps of Engineers contracted with Southwest Missouri State University for this Downstream Stockton Study. The Corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the contractor who is responsible for collection of the data, analysis, conclusions and recommendations.

The University designated a study team to make the investigation and the study team has drawn conclusions regarding the effects of power generation on the Sac River downstream of Stockton Dam. Since the Corps does not desire to interfere with the professional independence of the study team, those conclusions remain in the study. However, it should be noted that the Corps does not necessarily agree with the conclusions of the study team regarding the effects of power generation.

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Phase II program. Site 23CE252 (the Ronnie Pyle site) is considered significant for its potential to contribute further information concerning regional research problems in this part of the prairie-forest border. Shallow but intact cultural deposits are present at the site. Sites 23CE240 and 23CE241 were found to be extremely low-density, limited activity camps on alluvial surfaces probably dating from the Woodland period to the present and are assessed as ineligible for National Register listing.

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AND 23CE252 BELOW STOCKTON DAM ON THE SAC RIVER,
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ABSTRACT

Phase II archaeological test excavations were conducted by the Center for Archaeological Research, Southwest Missouri State University, at three prehistoric archaeological sites below Stockton Dam on the Sac River, Cedar County, Missouri, under contract to the U.S. Army Corps of Engineers, Kansas City District.

The purpose of the excavations was to test the sites to determine their eligibility for inclusion in the National Register of Historic Places. Methods of investigation included controlled and selective surface collection, shovel test transects, and non-contiguous test units. The research framework and significance discussions in this report were established from the perspectives of each site's research data potential, and significance evaluations are made in terms of regionally relevant and substantive research problems. These include settlement-subsistence variability, nature of the artifact assemblage, lithic technology and raw material utilization, and the potential for recognizing intrasite patterns in distribution of cultural material.

All three sites are considered small extractive or limited activity camps of the Woodland period (Horizon 1, 1000-1750 BP) situated in different ecotones in the Sac River floodplain. Each site has produced data relevant to the substantive research problems defined for the region; however, sites 23CE324, the J. Jones site, and 23CE235, the B. Jones site, cannot be considered significant relative to National Register of Historic Places criteria because their data-producing potential has been assessed as being essentially exhausted during the Phase II program.

Site 23CE252, the Ronnie Pyle site, is considered significant in light of its potential to contribute further information concerning regional research problems in this part of the prairie-forest border. Shallow but intact cultural deposits are present at the site. It is recommended that the Corps of Engineers seek a Determination of Eligibility for inclusion of the site in the National Register of Historic Places.

Since the project scope of work was originally issued, the Corps of Engineers has revised its construction plans, and the proposed channel cutoff has been relocated and will no longer adversely impact site 23CE252. Therefore, further data recovery at this site is not necessary at this time. However, the site should continue to be avoided by any future land modification in its vicinity or, if avoidance is not possible, a program of mitigation of adverse effects through data recovery should be conducted. A proposed data recovery plan is discussed.

Final determinations on the disposition of the remaining sites covered by this purchase order were made by the Corps of Engineers after the completion of the main body of the report. It was determined that site 23CE242 would not be impacted by the planned construction. Rights of entry were secured for test excavations at 23CE240 and 23CE241 and investigations

were conducted in the fall of 1982. The sites were found to be extremely low-density, limited activity camps on alluvial surfaces probably dating from the Woodland period to the present and the diagnostic artifacts found during the University of Missouri's 1976 investigations support this interpretation. No additional diagnostic artifacts, features, environmental remains, or discrete artifact concentrations were recovered during the test excavations, and the sites are assessed as ineligible for National Register listing.

CENTER FOR ARCHAEOLOGICAL RESEARCH

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PHASE II ARCHAEOLOGICAL TEST EXCAVATIONS AT 23CE324, 23CE235,
AND 23CE252, BELOW STOCKTON DAM ON THE SAC RIVER,
CEDAR COUNTY, MISSOURI: 1981

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Chapter I

INTRODUCTION

The present project was conducted by the Center for Archaeological Research, Southwest Missouri State University, under contract with the U.S. Army Corps of Engineers (COE), Kansas City District.

When the scope of work was originally issued by the Kansas City District in 1977 it encompassed the testing of five prehistoric archaeological sites, 23CE235, 23CE240, 23CE241, 23CE242, and 23CE252, to determine their eligibility for inclusion in the National Register of Historic Places, and to assess potential impact to the sites caused by power releases downstream from the Stockton Dam.

Because the Kansas City District was able to secure rights-of-entry for only sites 23CE235, the B. Jones site, and 23CE252, the Ronnie Pyle site, as of March 1981, the scope of work was amended to include work on these two sites, with the provision that should rights-of-entry be secured by the Corps of Engineers before the purchase order was complete, work would be performed on the other sites as well.

The notice to proceed was received on April 9, 1981, and the testing program began on May 26, 1981. Because site 23CE252 was in crops, and the COE right-of-entry specified that no investigations could be carried out on the property while it was in crops, the initial restricted phase of the program was conducted at 23CE235.

Shortly after beginning investigations at 23CE235 it became clear that the respective locations of the site, as determined during the 1976 cultural resources survey (Roper 1977) and during later COE relocation, were not only in conflict, but actually referred to two different sites, both potentially to be impacted by erosion of the banks of Sac River. The site recommended by the COE for test excavations was not the site recommended by Roper (1977). To resolve this discrepancy, the Center for Archaeological Research requested that the purchase order contract be further amended so that test excavations could be carried out not only at the site recommended by the COE but also at the site recommended by Roper. The COE site on which we worked in this initial phase of the project was subsequently reported to the Archaeological Survey of Missouri and assigned the number 23CE324, the J. Jones site.

The modifications and agreements to the contract were completed on August 24, 1981. Under this version of the contract, it was stipulated that the total of test excavations was to be divided equally between 23CE235 and 23CE324. All other terms of the contract remained the same. The completion of the testing program was conducted from August 31, to September 4, 1981. Timothy K. Perttula, Research Associate, was director of the project fieldwork, and was assisted by Rike Reuter-Hart, Kris Parker, and Carol Peeples, Research Technicians. Laboratory analyses were conducted by Perttula.

The purpose of this report is to present the results and recommendations of the testing program on the three sites (23CE235, 23CE252, 23CE324) below Stockton Dam on Sac River. Phase II testing guidelines developed by the Missouri Department of Natural Resources, Historic Preservation Program (Weichman 1979) were followed in the preparation of this report.

The project area is located in Cedar County, Missouri, in the Springfield Plain physiographic subarea, in the Sac River watershed, Osage River principal drainage basin and Missouri River major drainage basin (Figure 1; see Weichman n.d.). Sites 23CE235 and 23CE324 are currently being impacted by power releases from Stockton Dam which are causing extensive bank erosion in the channel of the Sac River. These sites are on the right bank of the Sac River 4.5 kilometers north-northeast of Stockton Dam, on the property of James Jones, Stockton, Missouri (Figure 2). Site 23CE252 is situated in an area originally planned for waste spoil activities associated with the construction of channel cutoff No. 4. Since the completion of the draft report the COE construction plans have changed so that the cutoff will no longer affect the site by either direct or indirect impacts (Donald L. Fritts personal communication January 18, 1982). This site, also on the right bank of the Sac River, is approximately 7 kilometers north-northwest of Stockton Dam (Figure 3), on property owned by Ronnie and Gilbert Pyle of Stockton, Missouri.

Scope of Work

The salient points of the scope of work are summarized in this section.

The purpose of the work is:

To determine the vertical and horizontal extent of the deposit and to assess the potential impact caused by the power releases of the Stockton powerhouse and construction activities.

Conduct sufficient investigations to satisfactorily evaluate such sites in terms of published criteria of eligibility for the National Register of Historic Places (36CFR1202 and 36CFR1204). For any sites which appear to meet these criteria, contractor (SMSU) will furnish a proposed plan for preservation or mitigation of adverse effect, and when appropriate a detailed estimate of man hours required for mitigation.

Study methods to be utilized consisted of: make a controlled intensive surface collection of each site.

Using 1 X 1 meter or 2 X 2 meter squares, perform test excavations. Minimum of 4 meters square at 23CE324 and 23CE235, and a minimum of 8 meters square at 23CE252. A minimum of 2 non-contiguous squares per site.

Collect artifactual material in 10-centimeter intervals within the test squares.

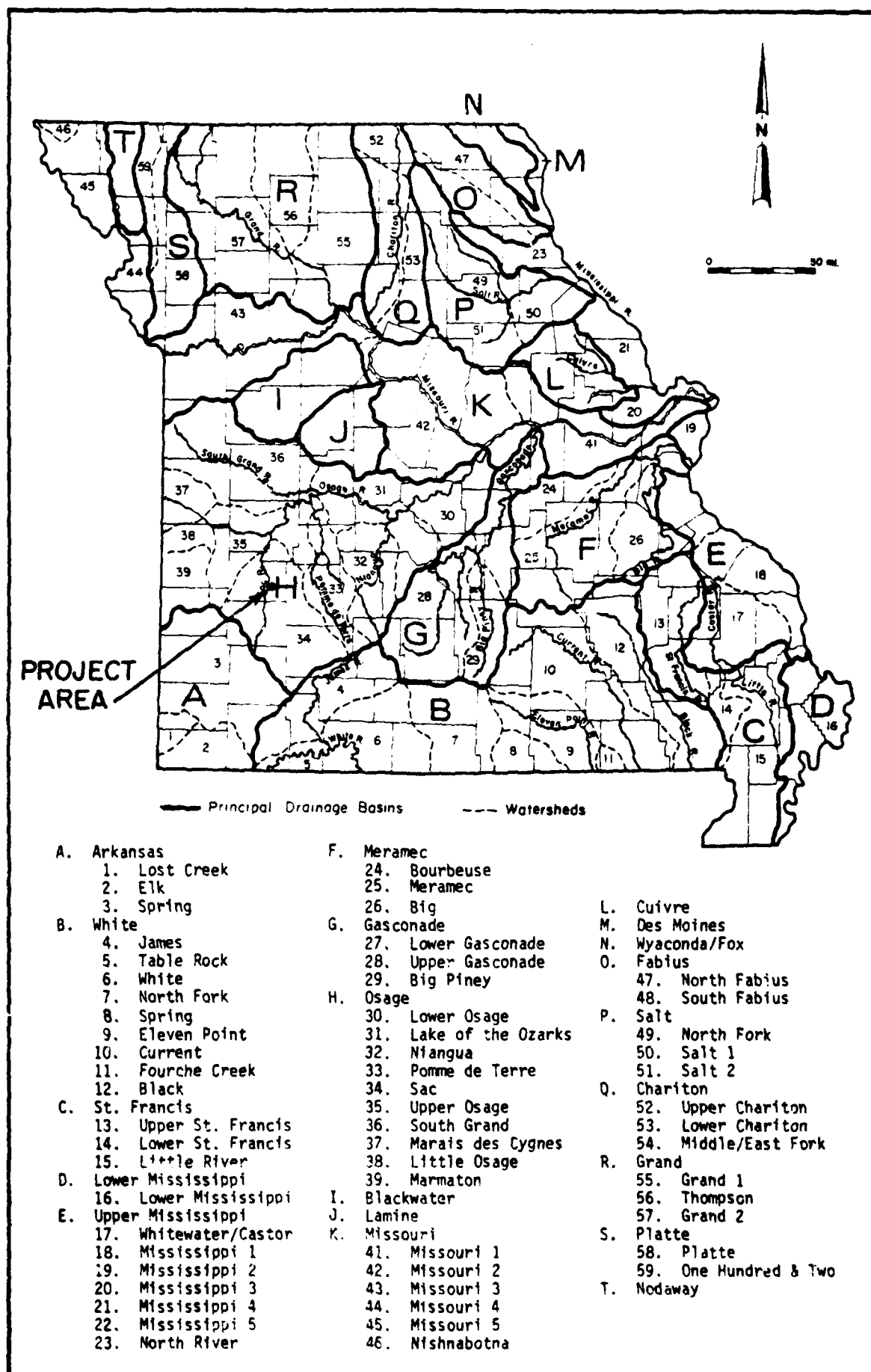


Figure 1. Location of project areas with respect to drainage basins and watersheds.

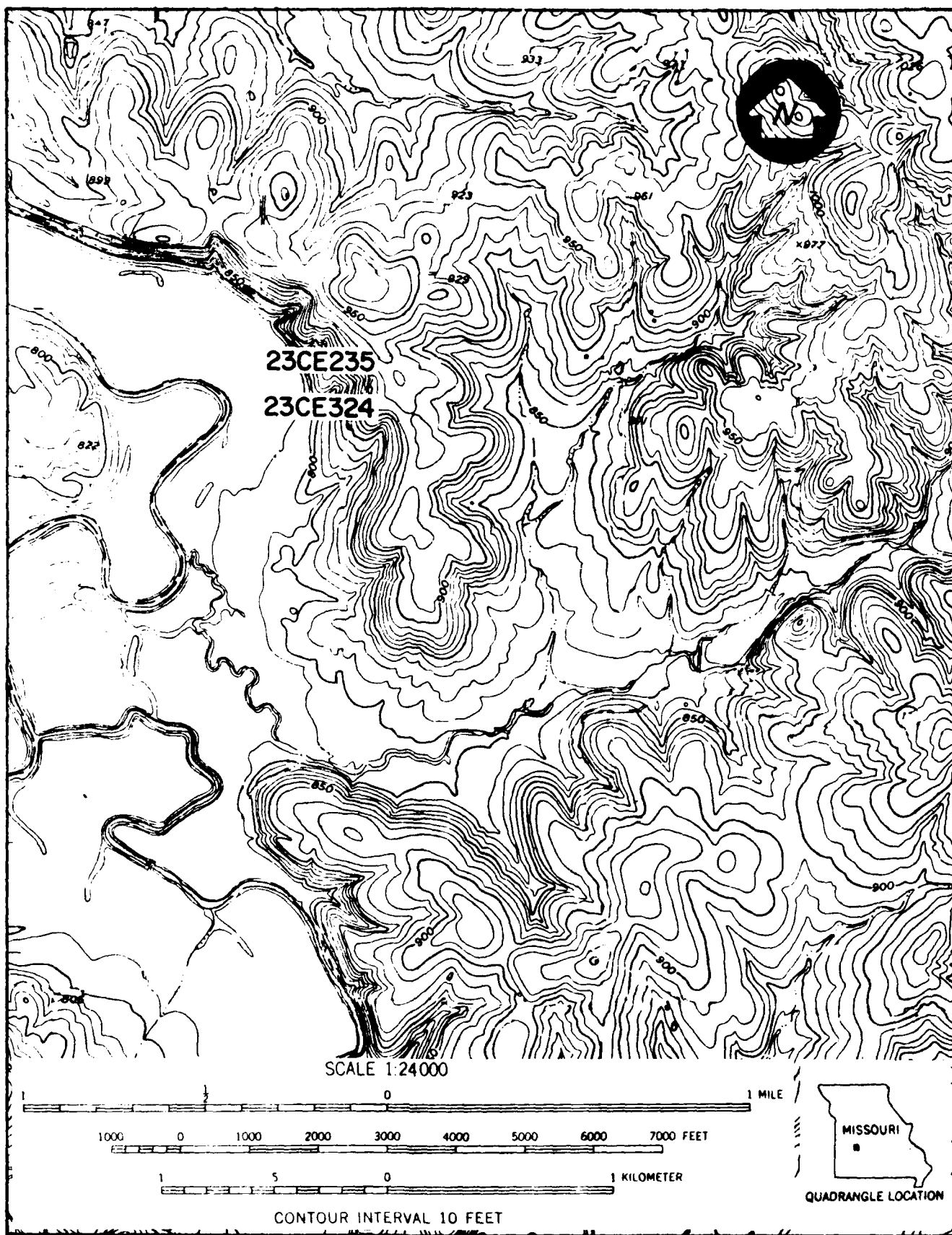


Figure 2 Topographic setting of B. Jones (23CE235) and J. Jones (23CE324) sites, Sac River Valley, Cedar County, Missouri

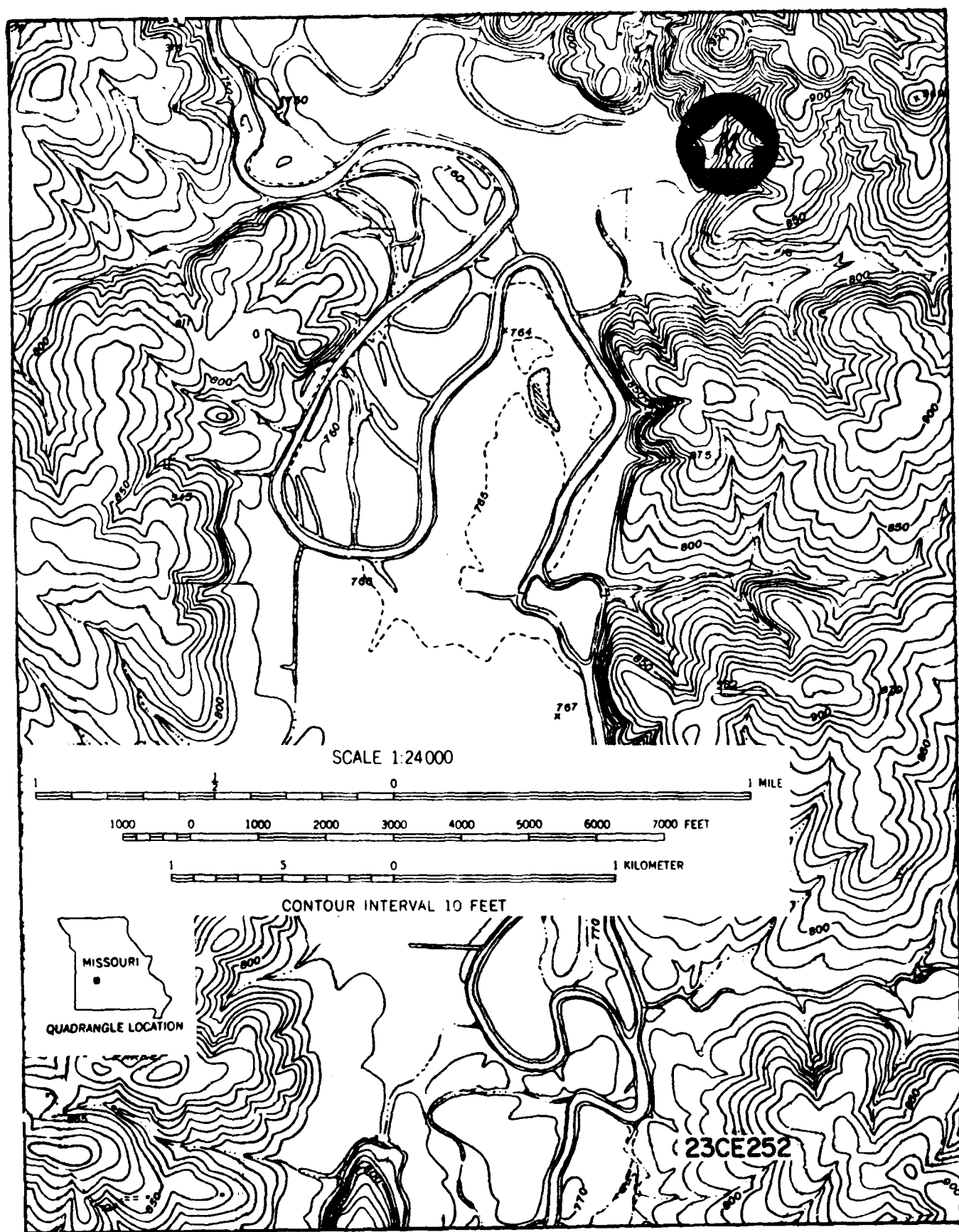


Figure 3. Topographic setting of Ronnie Pyle (23CE252) site, Sac River Valley, Cedar County, Missouri

One test square will be excavated to sterile material (sterile material is defined as containing no artifacts below the plow zone within a 20-centimeter interval).

Map the location, both vertically and horizontally, of all features.

Acknowledgements

We would like to thank the landowners, James Jones (23CE235 and 23CE324) and Ronnie and Gilbert Pyle (23CE252), for their cooperation during the duration of the project. Brian Jones was of considerable help during our initial assessment of 23CE235 in May, 1981. By archaeological tradition, site names have been given based on the landowners' last names.

Bill Savage, Soil Conservation Service scientist in Cedar County, Stockton, Missouri, provided detailed information on soil associations at the three archaeological sites.

Chapter II

PREVIOUS INVESTIGATIONS AT THE SITES

During 1976 the University of Missouri, American Archaeology Division conducted a surface reconnaissance survey along the Sac River from Stockton Dam to the Truman Reservoir (actually to Caplinger Mills in northern Cedar County) under a contract with the U.S. Army Corps of Engineers, Kansas City District (Roper 1977). The purpose of the survey was to locate cultural resources present in this area, and to evaluate the potential importance of all the sites, with appropriate mitigation recommendations for sites being affected by power releases from Stockton Dam.

To generate power releases at Stockton Dam it is necessary to discharge water from the dam at higher capacities than the Sac River channel can adequately handle. Therefore, water released at such a time tends to flood a considerable area downstream from Stockton Dam. Additionally, because of daily fluctuations in the level of the lake associated with different hydropower production needs, flood control, and amount of inflow, increased bank erosion, bottom scouring, and siltation are taking place in the downstream Sac River channel. Erosion of the channel is especially severe along river meanders on the outside of the meander loops, accompanied by silting and deposition on the inside of the meander loop (U.S. Army Engineering District, Kansas City District, 1975).

The Corps at that time considered a number of modifications to the Sac River channel, including a system of levees, bank grubbing, channel cutoffs, and regulation of downstream flow to a more constant level. Based on these modifications and the specific location of sites, six sites were recommended for further study by Donna Roper (1977:99-104). The Montgomery site (23CE261) has been considered elsewhere (Collins et al. 1977), while rights-of-entry on sites 23CE240, 23CE241, 23CE242 have not yet been secured by the Corps of Engineers. This section is intended to summarize what was known about 23CE235 and 23CE252 prior to this project, to discuss locational discrepancies between the Corps of Engineers and Roper (1977) with regard to 23CE235, and to describe the identification of a new site, 23CE324, in the project area.

23CE235 (B. Jones Site)

Documentation for the B. Jones site (Figure 2) consists of map information supplied by the U.S. Army Corps of Engineers, Kansas City office, the Harry S. Truman Reservoir Archaeological survey form, and the survey report (Roper 1977). The site is near the rapidly eroding bank of the Sac River on the outside of a meander loop, and, according to the survey form, is located on a "slight rise" in the floodplain, with the Sac River immediately adjacent to the south and the base of the bluff 0.4 kilometers away.

Because the Sac River floodplain is essentially featureless, the nearest landmark is Montgomery Lake, ca. 0.9 mile to the south. During the 1976 survey (Roper 1977) the site area was paced, and a partial

estimate of site size was 1750 meters square. A number of parallel transects 10 feet apart were surface collected on the site; the cultural material from the site is summarized in Table 1.

Table 1

Inventory of Cultural Materials Recovered from Site
23CE235 in 1976 Cultural Resources Survey*

- 1 Big Sandy projectile point
- 13 bifaces (classes 3-12)
 - 1 miscellaneous biface
 - 4 scrapers
 - 7 retouched and/or utilized flakes
- 12 cores
- 49 shatter
 - 7 cortex
 - 9 primary flakes
- 26 secondary flakes
- 57 tertiary flakes

* for class definitions see Roper (1977:41-44)

According to Roper (1977:102) "the quantity and diversity of artifacts from the site, and the presence of diagnostic Middle Archaic material suggest a base camp occupied sometime during the Middle Archaic period." Because it appeared that 23CE235 was a Middle Archaic base camp, it was thought potentially to contain information concerning a poorly understood period in western Ozark prehistory and cultural adaptations to the Hypsithermal climatic episode (Roper 1977:103). In 1976, the site was intact, but near the eroding bank of the Sac River. Because the site was threatened with destruction, it was recommended that the site be tested in the near future. The testing program (Phase II) is dealt with herein.

When the U.S. Army Corps of Engineers, Kansas City District, archaeologists attempted to relocate the site in early 1981, they determined that 23CE235 as located by Roper (1977) was incorrect (R. Grosser, personal communication 1981), and an aerial photograph supplied to the Center for Archaeological Research prior to beginning fieldwork indicated what was thought to be the correct location of the site. That location was relocated by these investigators, and was the scene of Phase II studies (see below).

However, in the process of reconnoitering the large cultivated field, and after our conversations with Brian Jones, the son of the landowner, it became clear that there were two concentrations of surface cultural material in this area adjacent to the bank of Sac River. One concentration was the one which had been recommended by the Corps in 1981 for testing, while the other concentration was ca. 50 to 100 meters to the west on a distinct landform. All evidence available to us strongly suggests that the western concentration is the site located by Roper (1977) and subsequently recommended for testing. This interpretation is based on the location of the concentration, the amount of material recovered by Roper and by us, and on

the general assemblage characteristics as described by Roper (see above). It is not, however, the site recommended by the Corps. Based on the respective maps, this western concentration (B. Jones site) is synonymous with the location of 23CE235 as plotted by Roper, though the site size estimates appear to be overly conservative.

The easternmost concentration then, while recommended by the Corps for testing, appears not to be the same one recommended by Roper. This site (J. Jones site) has subsequently been assigned site number 23CE324 by the Archaeological Survey of Missouri (ASM). Due to error, the J. Jones site was initially assigned site number 23CE155 by ASM. This number, however, had been assigned in 1964 to the Hogback cairn site (Wood 1965: 87-93), but a site form was never completed (A. Timbrook, Archaeological Survey of Missouri, personal communication 1981).

Because of the discrepancies involved in site locations, and the fact that sufficient testing for an assessment of site significance had already been carried out at the J. Jones site, 23CE324, by the Center for Archaeological Research in May 1981, the Corps of Engineers decided to amend the contract to allow limited Phase II excavations at 23CE235, the site originally recommended by Roper (see Appendix I). This portion of the Phase II investigations was carried out by the Center for Archaeological Research in August-September 1981, along with the investigations at 23CE252. No further work was deemed necessary then at 23CE324.

23CE252 (Ronnie Pyle Site)

The Ronnie Pyle site (Figure 3) is located on a lower ridge slope and alluvial terrace about 0.1 kilometer south of the Sac River, and about 0.6 kilometer south of the confluence of Silver Creek with the Sac River. Cultural material was located in a farm road at the apparent northern end of the site, but no estimate of site size was given in Roper (1977:Table 2). Cultural material recovered by the 1976 survey (Roper 1977) from 23CE252 is summarized in Table 2.

Table 2

Inventory of Cultural Material Recovered from Site 23CE252 in 1976 Inventory Survey*

- 1 unidentified projectile point
- 3 bifaces (classes 3-12)
- 1 scraper
- 5 retouched and/or utilized flakes
- 4 cores
- 1 hammerstone
- 23 shatter
- 2 cortex
- 1 primary flake
- 9 secondary flakes
- 46 tertiary flakes

* for class definitions see Roper (1977:41-44)

Since 23CE252 was located in a then planned "temporary work area easement (waste spoil) area connected with the construction of channel cutoff No. 4." Roper recommended that should this cutoff channel be constructed, mitigation efforts would be necessary to ensure that the information potential of the site would be properly exploited. It was felt that exploring the nature of "limited-activity" sites, such as 23CE252, would be important not only in attempting to understand the nature of prehistoric settlement systems in the Sac River basin, but also because few such sites have been investigated previously in the region (Roper 1977:104).

Chapter III

NATURAL ENVIRONMENTAL SETTING

The Stockton Dam area and the Sac River Valley are located in a region of significant ecological diversity and of intermingled habitats, with abundant prairie and forest plant and animal foods (e.g. F. King 1976a). Specifically, this area is situated in the Springfield Plain subdivision of the Ozark province (Bretz 1965) along the middle course of the Sac River (Figure 4).

The Springfield Plain forms the western border of the Ozark Plateau, from the Eureka Springs Escarpment to the east along the Pomme de Terre and Osage River valleys, to the Pennsylvanian shales and sandstones of the Osage Plain (Figure 4) on the west. It is an area of relatively gentle relief, particularly so in the more westerly portions of the Plain, with broad river valleys and moderately entrenched streams. Rock shelters and caves are present on the bedrock bluffs and valley walls of the Sac River and tributaries.

Hydrology

While the Osage River flows generally to the east and northeast, the Sac River and the Pomme de Terre flow from the south. As F. King notes (1978a:2-78), because both streams originate in the Ozark Highland, they derive some percentage of their flow from springs, and "as a result, stream flow is probably somewhat more dependable here than in other streams" (in the region) (F. King 1978a). The Sac River watershed begins along the northern edge of Grand Prairie and the western edge of Kickapoo Prairie in Greene County, Missouri, and encompasses portions of Greene, Lawrence, Dade, Polk, Cedar, and St. Clair counties. The Sac River is a major southern tributary of the Osage River and joins it north of the project area in the Harry S. Truman Reservoir (Figure 4).

The Little Sac River is the major eastern tributary of the Sac River, flowing in a northwesterly direction to its confluence with the Sac River just south of Stockton, Missouri. Other eastern tributary streams include Clear Creek, Bear Creek, and Brush Creek. Generally, because the eastern tributaries originate in the Ozark Highland along the Eureka Springs Escarpment, they have larger watersheds than do the western tributaries that drain the Osage Plain. Western tributaries of the Sac River include Turnback, Sons, Cedar, and Horse creeks. These valleys are shallower but wider than those of tributaries east of the Sac River.

Springs are present throughout the Springfield Plain, largely influenced by the Mississippian age limestone bedrock, but they are primarily small in size and discharge capacities (Vineyard and Feder 1974:192-193). Most of the perennial springs are located at the headwaters of the Sac and Little Sac rivers (Vineyard and Feder 1974:Figure 72).

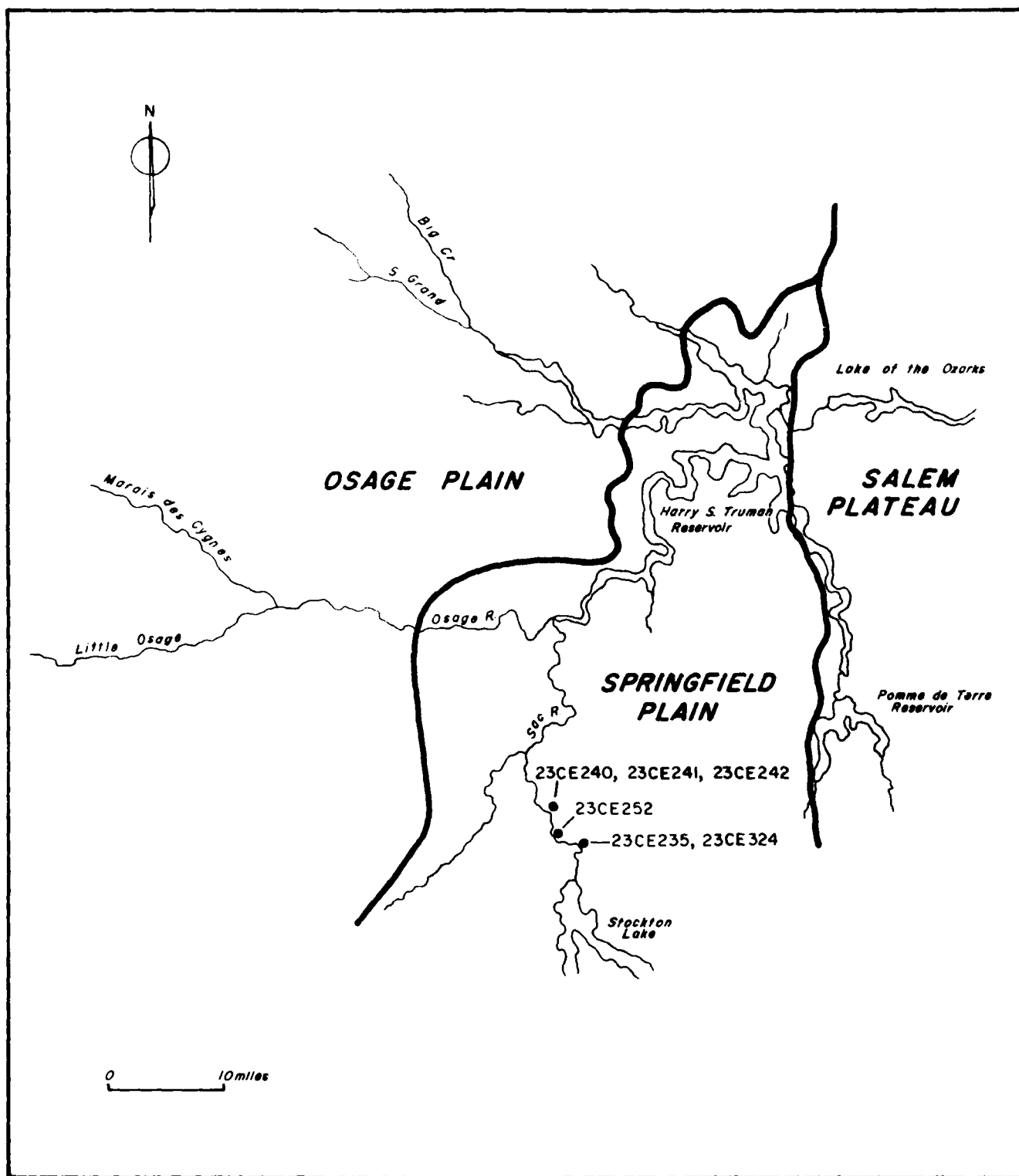


Figure 4. Location of downstream Sac River sites in relationship to physiographic subareas (after Rafferty 1980).

Soils

Soil characteristics are a combination of different factors, including topography, parent material, time, climate, and plant and animal life (U.S. Department of Agriculture 1975). The particular soil formations found within the Sac River can basically be divided into forest alfisols and prairie alfisols, ultisols, and inceptisols. The forest soils in the study area of the Springfield Plain are included in the Viraton-Wilderness and Peridge-Wilderness-Goss-Pembroke associations (Allgood and Persinger 1979:31-2), formed in loamy cherty limestone residuum in the uplands, and on the bottomlands alluvial soils of the Hartville-Ashton-Cedargap-Nolin association. Prairie soils include the Bolivar-Hector, Liberal-Barco-Collinsville, and Parsons-Credon associations, all formed in sandstone or shale formations of the Pennsylvanian age.

Prairie soils are more common west of the Sac River, but scattered patches of prairie soils are present east of the Sac River on the divide between the Sac and the Pomme de Terre, and in Polk County around Bolivar, the county seat. More specific floral and faunal characteristics of these associations will be discussed later in this chapter.

In the Sac River and Pomme de Terre River valleys to the east, floodplain deposits evidence considerable Holocene aggradation (Brackenridge 1981). This alluvial deposition, referred to as the Rodgers alluvium (Haynes 1977), has buried older floodplain channels and associated terrace and levee formations within the modern floodplain. Evidence from the Montgomery site (23CE261), just upstream from the project area, indicates that prehistoric cultural materials occur within this alluvium to at least ca. 4 meters below the present surface (Collins et al. 1977).

Geology and Mineral Resources

Mississippian age limestones are most frequent in the project area, consisting primarily of the Keokuk, Burlington, Chouteau, and Reeds Spring limestone and chert formations. Ordovician age formations are exposed along the valley walls of the Sac River but outcrop primarily to the east, except for one small area immediately below Stockton Dam. Below that point, Chouteau and Burlington limestone formations comprise the valley walls of the Sac River in the project area. Gravely Bluff to the immediate west of the project area has Pennsylvanian age Warner formation sandstones exposed (Collins et al. 1977). However, the majority of the Pennsylvanian age sandstones and shales (principally the Krebs subgroup) occur to the immediate east and north on upland settings. To the west the Osage Plain is formed on these younger shales (Figure 5).

Mineral resources of many different varieties are available in the Springfield Plain (e.g. McMillan 1976a:16-17). Chert is present in a number of Mississippian and Ordovician age formations, and the Burlington, Chouteau, and Jefferson City formations are the most accessible in the project area. Not only were cherts available in bedrock exposures and upland residuum, but also in bluff talus slopes, and stream gravel beds. Prehistoric quarries of Burlington chert are known in adjacent Polk County along the headwaters of the Pomme de Terre

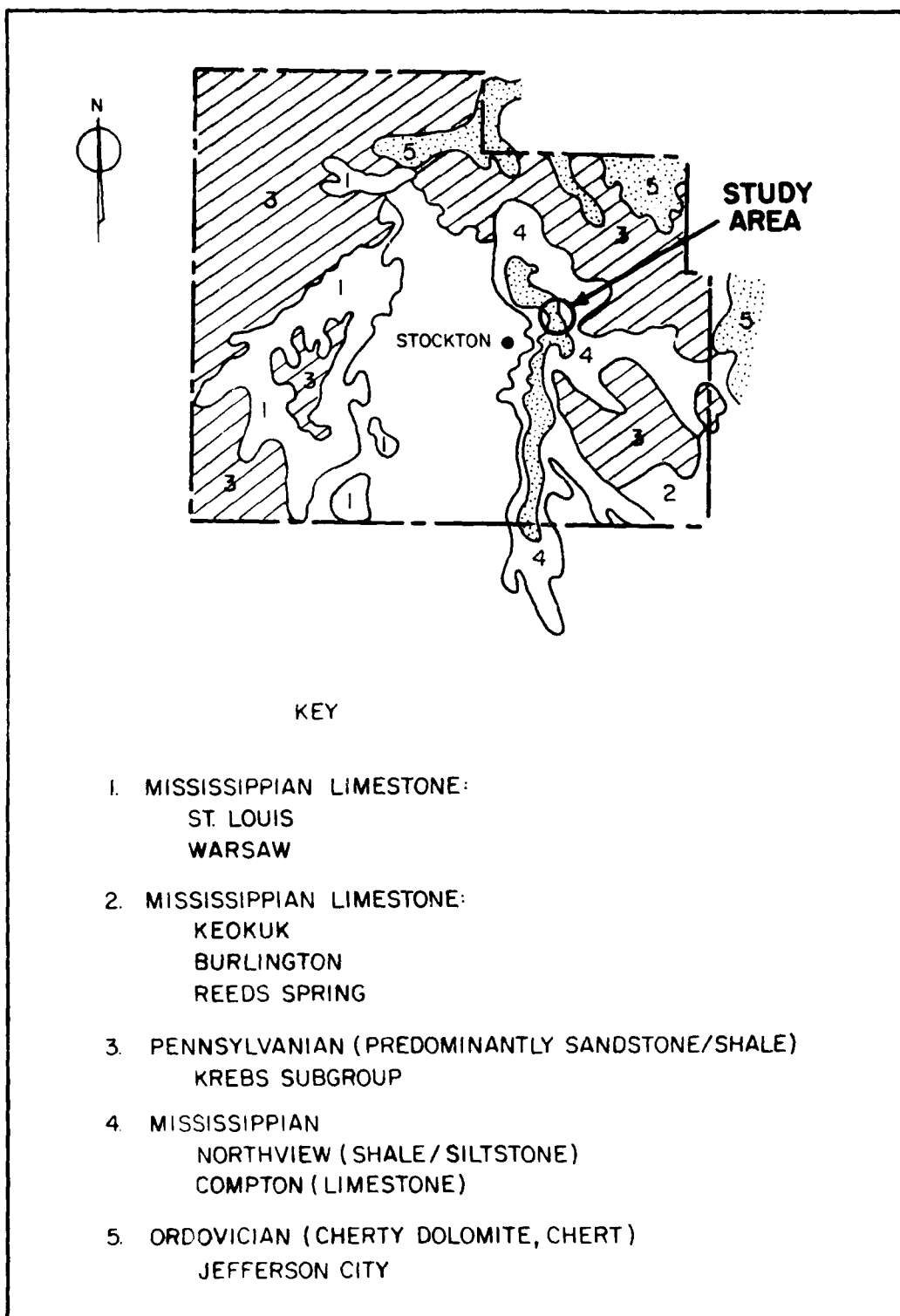


Figure 5. Surface geology of Cedar County, Missouri (after McCracken 1961).

Valley (Turner 1954), and similar quarries undoubtedly exist in the Sac River Valley. Because of the similar color of the cherts occurring in the different formations throughout the area, color alone would not seem to be sufficient to identify chert sources from archaeological assemblages. The presence of crinoids in the Burlington cherts, and oolites in the Ordovician cherts (LeeDecker 1980:11) may allow for specific chert formation identifications. The Jefferson City formation outcrops primarily east of the project area, but Jefferson City cherts can be found in the Sac River gravels along with the Burlington cherts. The Chouteau formation is more limited in distribution, occurring north of the project area along the Osage River (Branson 1918), and at the confluence of the Sac River with the Osage River (Griffin and Trimble 1977:62).

Sandstone was available and suitable for tool manufacture in the Jefferson City formation (Branson 1944:50), as well as in the Warner formation. Cottonrock, or fine-grained argillaceous siliceous dolomite, also occurs in the Jefferson City formation, and, according to McMillan (1976a:17), was "easily worked . . . a useful resource to aboriginal craftsmen."

Hematite and galena were available in the Pomme de Terre River, and probably in streams that drained the westernmost Ordovician formations in eastern Cedar County. Both minerals were sources of pigment and were extensively traded throughout the eastern United States (Walthall et al. 1980).

Climate

Climatic conditions for Cedar County are aptly portrayed by Borchert (1950) in his description of the Prairie Peninsula, the mid-continent grassland region. This area is low in amounts of winter rainfall and snowfall; most rain falls between May and September; extended dry spells or summer droughts are caused by warm, continental Pacific air masses and infrequent tropical air masses, resulting in thunderstorms. Summers are hot with mean maximum temperatures in July and August above 90°F, and the growing season is approximately 200 days.

Regional climatic conditions result from the long-term effects of more xeric or more mesic conditions on the prairie-forest border on the Springfield Plain. The prairie-forest border apparently has fluctuated and changed continually since its post-glacial establishment, in response to both short and long term climatic changes (e.g. Delcourt and Delcourt 1981). As Bernabo and Webb (1977:108) suggest:

From 7000 to 2000 BP, the prairie/forest border receded westward, but at a slower pace than it had expanded in the Early Holocene. The prairie/forest ecotone has thus been in motion during most of the Holocene, advancing eastward rapidly during the early Holocene and then retreating westward more slowly during the late Holocene.

Human adaptations to areas experiencing changes in climatic conditions have been a primary focus of research in the Pomme de Terre Valley (e.g. Wood and McMillan 1976; Kay 1978; Klippel et al. 1978). The Hypsithermal period, a period of reduced annual precipitation and/or warmer temperatures (e.g. Wright 1976), is recognized on the prairie-

forest border of Missouri between roughly 8300-5300 B.P. (Kay 1978). At that time relatively high frequencies of grassland species and small game were exploited at Rodgers Shelter (McMillan 1976b:229), and it was surmised (Kay 1978) that upland vegetation became increasingly prairie-like. Changes in the bottomland vegetation would have been less noticeable, though perhaps bottomland forest habitats decreased in area and did not extend as far up tributary streams as during more mesic periods (F. King 1978a:2-76).

Even during the period of Hypsithermal climatic change, it is likely that paleo-environmental changes were not sudden or radical but were gradual and variable across the landscape of the prairie-forest border. Based on the analysis of the faunal assemblage from Rodgers Shelter, Purdue argues (1978:9-57):

There was environmental change during the last 9000-10,000 years. The changes, however, were not drastic enough to precipitate a complete shift in species composition. Rather, all the habitats, i.e. upland forest, riparian forest, upland prairie, etc. were present in a mosaic pattern. As climate changed habitat patches expanded or contracted. For instance, as the Hypsithermal developed open habitats enlarged resulting in increased numbers of prairie animals already present, and perhaps, invasion by others requiring large habitat patches presently found farther west. Forest habitats were obviously still present, as indicated by the number of closed-habitat species found in the faunal record. Following the Hypsithermal conditions ameliorated in favor of closed vegetation and a concomitant decrease in size of prairie habitat patches.

Purdue's analysis would suggest that, contrary to McMillan's conclusions (1976b:227-229), the important point was not that the border between prairie-forest shifted back and forth but that the ecotone became more complex with the intermingling of niches. It is likely, however, that available upland food supplies were decreasing in quantity between the Sac and Pomme de Terre rivers during this time period. It is unclear, however, at what intensity upland resources were depended upon when compared to those from the more stable bottomland habitats. More specific implications of this recognized period of climatic change are discussed below with regard to Archaic settlement patterns and the utilization of bottomland habitats in the below Stockton Dam project area (e.g. Roper 1977:85, 89-90).

Flora

This area of the prairie-forest border has been intensively examined in developing and refining spatial and temporal models of Holocene vegetation by utilizing historical models (Howell and Kucera 1956), information on plant resource availability (F. King 1976a), and particular edaphic environmental associations (McMillan 1976a:20-35; F. King 1978a, b; Wood 1976a). General Land Office survey records have made it possible to arrive at generally accurate characterizations of the regional flora at a particular point in time, with analogs to prehistoric trends and historical descriptions from the Pomme de Terre Valley.

The Sac River Valley can be described as predominantly open, post oak forests and tallgrass prairies. As previously discussed, prairies are

confined predominantly either to relatively impermeable sandstones and shales, and flat lying areas--those below 0-2 percent slope (F. King 1978a:Figure 2-5)--or to sandstone/shale, and cherty limestones. More dissected areas, and higher slopes, were predominantly forested. The probable distribution of upland prairies in the immediate study area, based on the presence of low slopes and Pennsylvanian bedrock, is primarily on the east side of the Sac River, though in a regional context, more contiguous patches of prairie are present on the west side of the Sac River and Horse Creek (Figure 6).



Figure 6. Location of the study area along the oak-hickory-tall-grass prairie border (after McMillan 1976a and Kay 1978) (pre-settlement vegetation).

Upland prairies such as Lindley Prairie, between the Little Sac and Bear Creek, and the prairie centering on Humansville, between Bear Creek, the Sac River, and the Pomme de Terre River, are the most extensive prairie tracts on the east side of the Sac River. An upland prairie was probably present above Helt Bluff, ca. 0.5 mile north and east of sites 23CE235 and 23CE324. The primary constituents in prairies include Big and Little Bluestem (Andropogon gerardi and A. scoparius), Indiangrass (Sorghastrum nutans), Switchgrass (Panicum virgatum), prairie dropseed (Sporobolus heterolepsis), Junegrass (Koeleria cristata), slough grass (Spartina pectinata), and wild rye (Elymus canadensis).

(Allgood and Persinger 1979:61). Black and post oaks would occur on prairie edges, but in low densities and with low canopies since they are shade intolerant. Other plants, primarily food plants, present on upland prairies are listed in F. King (1976a:251-260).

Bottomland prairies have been recorded in the Pomme de Terre Valley; they were in abandoned meander loops above the modern floodplain (McMillan 1976a:27). According to F. King (1978a:2-53), bottomland prairies are to be expected on fine textured, poorly aerated soils, and they were possibly maintained by fire. In some instances, bottomland prairies are wet where they are flooded periodically. The broad terrace in the project area, with the old meander loop of the Sac River a prominent feature of the floodplain, would seem to be a prime candidate for the location of bottomland prairie tracts. Big bluestem would be most common, with Indiangrass more abundant in more mesic prairie situations.

The bottomland forest in the Sac River Valley was certainly the most varied of the forest communities on the prairie-forest border. The most common forest trees in the bottomlands were bur oak, black oak, post oak, and white elm. Both bur oak and white elm occur more frequently in bottomland situations than in more xeric upland niches (F. King 1978a:2-25). Basically, the distribution of tree species in bottomland forests is limited by the moisture and flood frequencies within well-developed floodplains such as the Sac River. Nineteenth century GLO Federal surveyors' reports indicate that the forest density in floodplains was low, ca. 15 trees/acre; the trees of this zone would have shaded less than 30 percent of the ground surface and would, therefore, have been a relatively open forest. This is important because nut-producing trees in an open forest tend to be larger and more productive than trees in a closed canopy forest since there is less competition for sunlight, water, and nutrients (F. King 1976b:264-265). The bottomland zone would in some instances have had a dense understory of shrubby trees and herbaceous plants.

Upland and slope forests would likely have been dominated by post oak and blackjack oak (F. King 1978a:Table 2-7). Tree densities were low in these areas as well, perhaps ca. 20 trees/acre (F. King 1978a:2-16). In slope forests, due to direction of the slope and exposure, more mesic trees, such as white oak, would be present on lower slopes facing north and east, with deeper soils, while the more xeric trees would be common on upper slopes facing south and west, and on dry, rocky upland ridgetops. In the Pomme de Terre locality, post oak, black oak, white oak, blackjack oak, and hickory were most frequent in upland settings. A similar situation can probably be expected in the Cedar County area, with lower frequencies of white oak. Mesic trees would decrease in frequency westward from the Pomme de Terre, being replaced by more drought-tolerant oaks, such as post oak and blackjack oak. F. King (1978a:Table 2-10) points out that white oak is infrequent in Cedar County, and predominantly restricted to the Ordovician limestones in the northeast and southwest corners of the county. Red cedar, so common now in Cedar County, was very uncommon at the time of the Federal Land Surveys. Cedar is susceptible to fire damage and with the cessation of regular and periodic fires, it became more common (F. King 1978a:2-43).

Oak barrens, i.e. scattered woodlands among the tallgrass prairies (McMillan 1976a:29), were most common on the slopes. Post oak, black oak, and blackjack oak were the main overstory constituents.

Summary

The post oak area native to the Cedar County region of the prairie-forest border was predominant in the project area, though only 61% of the post oak area was forested (F. King 1978a:2-20). Native tallgrass prairies were present on both sides of the Sac River, and the relatively continuous woodlands characteristic of the Ozark Highlands began to be broken up from the Pomme de Terre River west to the Osage Plain, a distance of approximately 30 miles. In this region, the more mesic trees such as red and white oak were replaced by drought-tolerant oaks with only occasional remnants of more mesophytic trees.

Fauna

A rather complete discussion of the fauna characterizing the modern prairie-forest border of the Springfield Plain is provided by McMillan (1976a:35-41); fauna exploited during the past in the Pomme de Terre locality has also been described in Parmalee et al. (1976:144-160) and Purdue (1978).

The fauna of the prairie-forest border is reflective of its transitional position between biotic associations and includes species adapted to xeric and mesic communities. Regardless of whether the concept of "edge effect" is applicable or relevant (e.g. McMillan 1976a; Rhoades 1978), a large variety of mammals would have been available in the diverse open and closed habitats of the area.

Prairie species appeared during the Mid-Holocene (Purdue 1978:9-55), and included bison, pronghorn, jackrabbit, badger, and spotted skunk. They were most common in Horizons 5-7 at Rodgers Shelter, dated ca. 8100-5200 B.P. (Parmalee et al. 1976:Tables 9-2 and 9-3; Kay 1978:Table 4-3); however, they were also present in earlier and later horizons. Bison, in particular, was most common in Horizon 8, ca. 8600-8100 B.P. Slow water fishes, the catostomids and ictalurids, were also most common during the Hypsithermal period; fast water centrarchids are common in the post-Hypsithermal faunal assemblage (Purdue 1978:9-24).

Small animals dominate the faunal assemblage at Rodgers Shelter, particularly eastern cottontail and squirrel (fox or gray squirrel). These species are usually found in open woodlands.

A wide variety of birds, amphibians, fish, and mussels was also available. Wild turkey and small perching birds were most commonly utilized; prairie chicken and bobwhite, both grassland species, were concentrated in Horizon 7. Various amphibians and reptile species were present, including the box turtle, aquatic turtles, frogs, and toads (Parmalee et al. 1976).

Fish and mussels were extensively utilized, being gathered from the deep pools and eddies (fish) and from the shoals and riffles (mussels) of the larger permanent-flowing streams of the region. Catfish, sucker, and gar were frequently exploited, but a variety of species was present and taken. Elliptio dilatatus, Actinonaias ellipsiformis, Actinonaias carinata, and Fusconaia flava were the most abundant freshwater mussels gathered by the inhabitants of Rodgers Shelter (Klippel et al. 1978:Table 4). While mussels were utilized from the Early Archaic period on they were most intensively utilized during the post-Hypsithermal occupations there, ca. 3600-1000 B.P. (Klippel et al. 1978:262).

Just as important as the wide variety of plant and animal foods available in the prairie-forest border region is the spatial and temporal availability of those resources, in both synchronic and diachronic perspectives. Roper's analysis for the Sac River Valley (Roper 1977:12-18) suggests that in short-term trends in the river bottoms spring to fall are the months when most plant foods (nuts, tubers, greens) are available, while small mammals are most abundant in the bottoms. Mammals tend differentially to utilize niches by season (e.g. Smith 1975), but would have been available year-round. An important point to consider is the process of selection of plant and animal resources by particular cultural groups of different times and places. That is, it seems evident that man does not always utilize resources in direct correlation with their abundance (Smith 1979), but selects those particular resources which are deemed suitable and necessary for protein sources, food energy, tools and a host of other reasons, while avoiding other potential resources. Tastes, taboos, accessibility, ease of procurement, and scheduling conflicts are some of the variables which influence the selection of plant and animal resources. Developing predictive models of resource selection thus is dependent upon specifying the relative value of particular resources and the costs and risks involved in their utilization (Earle 1980). However, the accuracy of prediction is limited by such nonmaterial variables as taste, tradition, and taboos.

Based on the distribution of potential food sources in the various niches present in the Pomme de Terre locality, and the likely inference that the Sac and Pomme de Terre are quite similar in plant and animal distribution and available water, it is clear that the bottomland forests are of major importance in economic strategies in the prairie-forest border (F. King 1978a:Figure 2-26), followed by open woodlands and oak-hickory forests. The latter, as noted above, are more common toward the eastern edge of Cedar County. Bottomland and upland prairies are of less importance because of the lower total number of food species available, particularly plant resources.

Under fluctuating climatic conditions, it is to be expected that the availability of potential food resources will change across space just as the extent and nature of various habitats change. Under moist early Holocene conditions, the extent of woodlands outside of the major stream valleys would increase, just as they would decrease during the Hypsithermal. In the Rodgers Shelter locality, by 8100 B.P. stream flow reduced, but the riparian habitats in the major bottoms remained stable until ca. 5200 B.P. (Kay 1978: 5-50; Haynes 1976:59). The extent of bottomland habitats became "increasingly confined to the floodplains of major streams during dry periods and extended further up tributary valleys with periods of increased precipitation" (F. King 1978a:2-76).

Thus, bottomland environments would be of increasing importance during the more arid period as more open prairie habitats appeared in the uplands, and less diverse habitats were present in the tributary valleys. This supposition is the basis for Donna Roper's (1977) Middle Archaic settlement pattern model emphasizing bottomland resources and grasslands. With the establishment of more modern forest habitats in the post-Hypsithermal, it is expected that a wider procurement network of more varied habitats (i.e. tributary streams, upland forests) would result (Roper 1977:90).

Because the habitats in the prairie-forest border have a linear orientation, with little breadth to each, almost all of the local species of animals and plants could have been acquired within a relatively short distance from most points within the Sac River Valley. The inferred strategies utilized to

exploit the potential natural food resources of the region point to a long-term stability in basic gathering and hunting patterns (e.g. Roper 1979a) in the Springfield Plain of the western Ozark region. Based on similar patterns of plant and animal resource availability and water distribution in the Pomme de Terre and Sac River valleys, a strong case can be made for comparable patterns of prehistoric resource utilization. Given the intensive investigations along the Pomme de Terre and in the Harry S. Truman Reservoir area since the early 1960s, and the relatively impoverished state of archaeological knowledge in the Sac River basin (e.g. Chapman 1975, 1980), the data for that area, even in its present unsynthesized state, can serve as a rich source of analogs and hypotheses applicable to prehistoric adaptations in the Sac River.

Chapter IV

PREHISTORIC BACKGROUND

The state of archaeological knowledge in the Sac River basin is hardly what can be called comprehensive or systematic. Due to various constraints (e.g. Chapman 1980:83), excavations at both Stockton Reservoir and the now de-authorized Hackleman Corner Reservoir were oriented predominantly toward cave and shelter sites, and bluff-top mound and cairn sites. While the preliminary survey and test excavation report for Stockton Reservoir (Chapman et al. 1963:160-162) recommended that open sites should be investigated, it was not until the final two years of the project (1966 and 1967) that floodplains and terraces of the Sac and Little Sac rivers were examined with the aid of earth-moving equipment to expose subsurface cultural features. No open sites were examined at the Hackleman Corner Reservoir site (McMillan 1965a) on Cedar Creek west of the Sac River.

The focus of the research was basically twofold: (a) utilize whatever sites were necessary to obtain a good culture-historical sequence in the area; and (b) examine and explicate in detail the Woodland burial mound complexes in the Sac River basin to delimit the nature of the burial ceremonies, better define the complexes proposed by Wood (1961) from the Pomme de Terre Reservoir, and associate the particular burial complexes with the particular occupations revealed in the Reservoir area. These research goals were maintained throughout the investigations at Stockton Reservoir.

Table 3 lists all sites in this area of the Sac River basin that have been professionally excavated and reported on in some fashion in the literature or in unpublished manuscripts on file with the National Park Service, U.S. Army Corps of Engineers, or the Missouri Historic Preservation Program. Fifty sites have been examined. Sixteen sites are caves and rock shelters, 26 are bluff-top rock mounds or cairns, 1 is an upland lithic scatter, and the remaining 7 are open sites on the Sac and Little Sac River floodplains. Three of the 7 open sites have house and pit features present in undisturbed contexts, while a fourth--the Montgomery site (23CE261)--has an extensive series of buried Dalton and Early Archaic occupations exposed by river bank erosion (Donahue et al. 1977:124-129; Collins et al. 1977). No deep site sampling was conducted in the floodplain alluvial deposits of the Sac and Little Sac, but based upon the evidence from the Montgomery site, the Harry S. Truman Reservoir project (e.g. Piontkowski and Joyer 1977) and the extensive excavations at Rodgers Shelter and Phillips Spring (Kay 1978), it is extremely likely that such components are present in the Stockton Reservoir area.

The Downstream Stockton survey, and the survey of upland locations within the U.S. Army Corps of Engineers easement at Stockton Reservoir (Nichols 1979, 1980; Cole 1979) are important because they allowed the examination of particular environmental zones and niches that previously did not receive adequate attention relative to their apparent density and variability. According to Roper (1977:2-3) the primary focus of research in Southwest Missouri has been concerned with prehistoric settlement-subsistence behavior. This involves examining the distribution of prehistoric groups across the landscape and the nature of the different activities conducted at particular loci, and

Table 3

Inventory of Excavated Sites in the Stockton Reservoir Area and Vicinity

Reference	Site #	Topography	Projectile Points		Ceramics			Ecofacts	Feature
			Arrow	Dart	Limestone	Shell	Clay/Sand		
McMillan 1965a	CE32	shelter	-	-	-	x	x	x	--
"	CE190	bluff top	-	-	-	-	-	x	burial mound
"	CE198	blufftop	x	x	-	-	-	-	burial mound
McMillan 1965b	CE111	shelter	-	x	-	-	-	x	--
"	CE112	shelter	x	x	x	-	x	x	burial
Chapman et al 1963	CE104	bluff top	x	-	-	-	x	-	burial mound
"	CE123	bluff top	x	x	x	-	-	-	burial mound
"	DA218	bluff top	x	x	-	-	x	-	--
"	DA240	shelter	x	-	x	x	-	x	burials
"	DA245	shelter	x	x	x	x	-	x	burials
"	CE105	shelter	x	x	-	x	x	-	--
Wood 1965	P0305	bluff top	-	x	-	-	-	-	burial mound
"	DA222	bluff top	x	x	x	-	-	x	burial mound
"	DA225	bluff top	x	x	x	x	-	x	burial mound
"	DA226	bluff top	x	x	x	-	-	x	burial mound
"	DA306	bluff top	x	-	x	-	-	x	burial mound
"	CE122	bluff top	x	x	x	-	x	x	burial mound
"	CE155	bluff top	x	x	-	-	-	x	burial mound
"	P0300	bluff top	x	x	x	x	-	x	burial mound
"	P0301	bluff top	x	-	-	-	-	x	burial mound
"	P0307	bluff top	x	-	-	x	-	x	burial mound
"	DA219	bluff top	x	x	x	x	-	x	burial mound

Table 3 (continued)

Inventory of Excavated Sites in the Stockton Reservoir Area and Vicinity

Reference	Site #	Topography	Projectile Points		Ceramics			Ecofacts	Feature
			Arrow	Dart	Limestone	Shell	Clay/Sand		
Wood 1965									
"	P0304	bluff top	x	-	-	x	-	x	burial mound
"	DA237	bluff top	x	x	-	-	-	x	burial mound
"	DA221	bluff top	x	x	-	-	-	x	burial mound
"	DA223	floodplain	x	x	-	-	-	-	--
"	DA231	floodplain	x	x	-	-	-	-	--
Wood 1966									
"	CE148	bluff top	x	x	-	-	x	x	burial mound
"	CE150	bluff top	x	-	x	-	-	x	burial mound
"	CE152	bluff top	x	x	x	x	x	x	burial mound
"	CE246	bluff top	x	x	-	-	-	x	burial mound
"	DA216	bluff top	x	x	-	-	x	x	burial mound
"	DA250	bluff top	x	x	Caddoan Vessel			x	burial mound
Wood 1966 Pangborn et al. 1971	CE153	floodplain	x	x	-	-	-	x	pits/houses
Wood 1966	DA252	floodplain	-	-	-	-	-	-	historic grave
McMillan 1965b	DA51	shelter		x			x		--
"	DA303	shelter							--
Kaplan et al. 1967	P0309	floodplain	x	x	x	-	x		houses/ pits
Ward 1968									
Kaplan 1969	DA254	bluff top	x	x	-	-	-	-	bedrock mortars

Table 3 (continued)

Inventory of Excavated Sites in the Stockton Reservoir area and vicinity

Reference	Site #	Topography	Projectile Points		Ceramics			Ecofacts	Feature
			Arrow	Dart	Limestone	Shell	Clay/Sand		
Calabrese et al. 1968	CE120	floodplain	x	x	-	-	-		houses/ pits
Wood and Pangborn 1968e	CE126	shelter	x	x		x	x	x	--
McMillan 1965b	DA50	shelter		x		x	x		--
Wood and Pangborn 1968d	DA207	shelter	x	x	x	x	x	x	--
McMillan 1965b	DA241	shelter			Caddoan		x		--
"	DA242	shelter	x		x	x	x	x	--
"	DA300-302	shelter	x		Caddoan		x		--
Collins et al. 1977	CE261	floodplain	-	x	-	-	-	-	buried Early Archaic

developing models of how human communities adapted to the natural environment around them. Of main concern has been the development of settlement pattern models as reflected in the archaeological record. The particular theoretical and methodological concepts in the study of settlement pattern change utilized by previous researchers (site catchment analysis) will be discussed in the next section. What is important to state here is that the utilization of settlement pattern data in the Sac River basin provides the most suitable framework to synthesize the diverse regional data base that is the prehistoric archaeological record, and thus hopefully to bring together in a common explanatory framework the archaeological data of the region. Therefore, this discussion will be oriented to describe (where possible) temporal and functional changes and stability in settlement and subsistence within the topographic settings recognized in the Sac River basin, rather than by considering those variables within an overriding cultural-historical scheme. However, emphasis will be on cultural processes which require a diachronic perspective, so chronological designations are necessary.

Chapman (1975:230; 1980:264) suggests the following cultural period sequence for the Western Prairie region of the Springfield Plain:

Historic	A.D. 1700-following
Late Mississippi	A.D. 1450-1700
Middle Mississippi	A.D. 1200-1450
Early Mississippi	A.D. 900-1200
Late Woodland	A.D. 400-900
Middle Woodland	500 B.C.-A.D. 400
Early Woodland	1000 B.C.-500 B.C.
Late Archaic	3000 B.C.-1000 B.C.
Middle Archaic	5000 B.C.-3000 B.C.
Early Archaic	7000 B.C.-5000 B.C.
Dalton	8000 B.C.-7000 B.C.
Paleo-Indian	12,000 B.C.-8000 B.C.

As noted by Roper (1979a:9) it is easier to place occupations in the western Ozarks by general temporal period (*sensu* Willey and Phillips 1958) than it is to use the presence of particular stylistic attributes (i.e. dentate stamped sherds for the Middle Woodland, or shell-tempered ceramics for Mississippian) to construct local sequences. This is simply because the appropriate stylistic classes are not present, or are present in such low frequencies that the whole process is very difficult, and because local chronological markers are, as yet, poorly defined. Therefore, while the periods defined by Chapman may be appropriate as such, the taxonomic divisions utilized in describing local western Ozark sequences are probably more arbitrary than in other parts of the eastern Woodlands (e.g. Roper 1979a), and certainly do not imply the same content-based periods recognized in other areas. That is, changes from period to period as implied in the sequence may reflect to a major extent nothing more than addition of certain artifact classes to a basically long-lasting and stable lifeway (see Purrington 1971).

More specific temporal placements, such as those developed for the occupations at Rodgers Shelter (e.g. Kay 1978:Table 4-3), will be utilized where possible. The Rodgers Shelter classification and the particular diagnostic projectile points present by horizon, are presented in Table 4.

Table 4

Rodgers Shelter Culture Sequence and Horizon
Projectile Point Series (after Kay 1978)

Horizon 1	1000-1750 B.P.	Rice side-notched Scallorn Langtry Gary
Horizon 2	1750-2500 B.P.	Rice side-notched small side-notched dart Stone stemmed
Horizon 3	2500-3600 B.P.	Etley, Smith, Sedalia lanceolate Table Rock stemmed
Horizon 5	5200-6700 B.P.	Marcos Williams
Horizon 6	6700-7500 B.P.	Williams Hidden Valley
Horizon 7	7500-8100 B.P.	Rice lanceolate
Horizon 8	8100-8600 B.P.	Rice lanceolate
Horizon 9	8600-9500 B.P.	Rice lanceolate Rice lobed Graham Cave side-notched
Horizon 10	9500-10500 B.P.	Fluted lanceolate Rice lobed Jakie stemmed
Horizon 11	10500-11000 B.P.	Dalton Plainview

Caves and Rock Shelters

Caves and Rock shelters are common in the Sac River basin, and were formed through the differential weathering of bedrock formations and the development of underground water passages that created caverns that issue to the surface and are marked by caves. Shelters provide easily utilized loci for habitation because they offer protection from poor weather, are usually dry, and are frequently large enough to accommodate a large number of people at one time. That these locations were frequently utilized for extended residence is attested to by the talus slope middens that occur in conjunction with occupations within the caves and shelters.

These locations were utilized from an early date in regional pre-history. Horizon 9 or Early Archaic (Table 4) projectile point forms are known from 23DA218 (Chapman et al. 1963:160) and 23DA51 (McMillan 1965b:178), but it is not until the Late Archaic period that caves and rock shelters began to be more commonly utilized. No large or deeply stratified rock shelters are known or have been excavated in the Sac River basin that would seem to compare with shelters such as Rodgers Shelter (Wood and McMillan 1976) or Blackwell Cave (Wood 1961:52-62; Falk 1969) along the Pomme de Terre River. Indeed most shelters are small and have little concrete evidence for more than one primary period of occupation (Wood and Pangborn 1968b, c, d, e; McMillan 1968b).

Little cultural material can be adequately assigned to the Late Ceramic occupations in caves and rock shelters in the region because of small assemblage sample sizes, pot hunter disturbances, and the lack of good contextual data such as pits, features, or internal stratigraphy.

At Mache Hollow Shelter on Bear Creek (McMillan 1965b; Wood and Pangborn 1968b) a small faunal assemblage of woodland and aquatic species--deer, beaver, and turtle--was associated with small side-notched and corner-notched projectile points/knives (PPKs) and a scattering of human bone from a disturbed burial.

The vast majority of caves and rock shelters in the Sac River basin was utilized throughout the Woodland and Mississippi periods. In most instances, the small quantities of faunal and floral materials present point to seasonal use of these locations. Burials have not been recorded at many shelters, with only 23DA240 and 23DA245 (Table 3) having such evidence. Grit-, sand-, clay-, limestone-, and shell-tempered ceramics are present in varying frequencies at all of the rock shelters, with differing associations being proposed with the ceramic types and the other artifactual debris present in the shelter deposits.

In general, shell-tempered ceramics have been considered the latest ceramic ware in use, preceded in time by limestone- and grit/sand-tempered wares (Wood 1961:93). Taterhole Cave (23DA50) and Griffin Shelter (23DA51) have dentate stamp, punctate, punch and boss, and zoned dentate stylistic motifs on sandy paste ceramics that resemble Middle Woodland motifs (Chapman 1980:27). Rocker-stamped sherds are also known from Soledad Shelter (23CE112) on grog-tempered wares (McMillan 1965b). Langtry and Rice side-notched projectile points are common associations. The general inference is that such locations were seasonally, if intensively, utilized as residential bases (e.g. Binford 1980), with food procurement, preparation, and storage the most common activities carried out. It is doubtful if the ceramic vessels found at these sites were carried back and forth from different residential bases because they were

fragile and not overly common. Rather, it appears they may have been "cached" at rock shelter locations and used in storing wild foods like nuts and seeds, whose remains are often found in the cave deposits. In no shelter deposit of this period, or of the following periods, do the ceramic assemblages represent more than five vessels, suggesting a relatively long use life for the vessels and the relative infrequency of their use or manufacture. The Dunnegan aggregate (Wood 1961:73-76, 90), from an open site on Bear Creek in Polk County, might be an example of the type of residential site associated with the seasonal utilization of rock shelters. The ceramics from this site are sand-tempered globular vessels decorated with punctations, tool impressions, and trailing, and the projectile points recovered all resemble Snyders corner-notched points found in Middle Woodland contexts elsewhere (Kay 1980). Sand-tempered ceramics and corner-notched dart points have also been described from 23DA227 (Chapman et al. 1963:59-66), an open site on the Sac River. No excavations have been conducted at these sites.

During probably what is the Late Woodland period, plain and cord-marked limestone-tempered pottery occurs in association with small projectile points or arrowpoints and large projectile point/knives like Rice side-notched. The presence of limestone-tempered pottery at rock shelters, open sites, and bluff-top burial mounds attributed to the Late Woodland Bolivar complex (Wood 1966) would suggest that the three different site types represent activity/settlement components which are integral and related parts of one Late Woodland settlement system. However, the overall lack of excavations at open village components makes the association not entirely convincing. No local taxonomic unit has been defined at this time period; but the Late Woodland Lindley phase (Chapman 1980:91-93), originally defined in the Pomme de Terre Reservoir area (Wood 1961:90-92), has been suggested to have a spatial distribution extending into the Sac River basin.

Through the remainder of the Late Woodland and Mississippi periods rock shelters and caves were utilized periodically in similar fashion to previous phases. Storage and procurement activities remained dominant, and the only changes discernible in the archaeological record are stylistic developments in projectile point forms and shifts in the frequency of different ceramic tempering agents.

In some instances, evidence of interaction with neighboring groups (or the actual utilization of these locations by neighboring peoples; see Chapman 1980:139, 150), such as the Arkansas Valley Caddoan Spiro phase, is seen from the archaeological material in the Sac River basin. Caddoan fine-grit and bone-tempered engraved ceramics from three shelters at Sand Bluff above the confluence of Turnback Creek and Sac River were identified by Clarence H. Webb as Spiro or Holly Fine Engraved (McMillan 1965b:189). These obvious trade materials were associated with locally produced clay, clay-grog, and grit-tempered Late Woodland ceramics. However, if these ceramics do indeed derive from a Spiro phase context (Brown et al. 1978:171), dates between ca. A.D. 1200-1350 would be most appropriate, and, thus, strictly on temporal grounds the ceramics would belong to the Mississippi period. This is where Chapman (1980) discusses them. The period from A.D. 1200-1350 in the Caddoan area is marked by the extensive distribution of ceramic vessels, and a high-point in inter-regional trade, from the Kansas prairies (Wedel 1959) to Cahokia (Fowler and Hall 1975), and such evidence of trade is characteristic throughout the Caddoan area (e.g. Story 1981).

Steed-Kisker (Mississippi period) utilization of rock shelters and caves as loci for procurement and processing of prairie resources like bison

is known from St. Clair County, to the immediate north (Wood 1968). None of the shell-tempered ceramics from the Stockton Reservoir area are analogous to Steed-Kisker phase ceramics and in all respects do not closely resemble other regions where shell-tempered ceramics were utilized. Both plain and cord-marked, shell-tempered wares were in use at this time (Wood 1965, 1966). Shell-tempered ceramics are present in Stockton complex (Wood 1965:130-133) burial mounds, but no open site villages have been identified in the Sac River basin that have shell-tempered ceramics. The distinctive Mississippi period double- and triple-notched and side-notched arrowpoints do occur at 23DA234 on the Sac River floodplain (Chapman et al. 1963:61); the site is multi-component, however. A similar situation exists in the Pomme de Terre Reservoir area, where no shell-tempered pottery is known from sites except in burial mounds and Blackwell Cave (Wood 1961:108).

Uplands and Bluff Tops

Bluff-top lithic scatters occur along the Sac and Little Sac River valleys (e.g. Nichols 1980; Cole 1979), but only the Sand Ridge (23DA254) site above the Sac River has been excavated to date. Flake debris, projectile points, and a small number of utilized flakes, were recovered from the site in association with seven bedrock mortars. No faunal or floral materials were recovered in the excavations. The projectile points indicate a periodic reutilization of the area during the Late Archaic through Woodland periods. The cultural material was concentrated around the bedrock mortars a short distance away from the edge of the bluff (Kaplan et al. 1967:34-43).

Most of the other upland scatters with available information point to their being Late Archaic occupations. It is likely that these sites represent loci designed to exploit the rich wild plant food products available in upland hardwood forests, especially the processing of nuts. We would expect sites of this nature to date to sometime after the inception of modern climatic conditions and the establishment of modern hardwood forests, that is, in the post-Hypsithermal. However, given the probable low density of upland woodlands as compared to upland prairies at this period of time (see Chapter III), these sites would tend to be concentrated in certain topographic settings, and hence not uniformly distributed through the environment.

The major components of the archaeological record represented in upland and bluff settings are rock mounds and cairns where a wide variety of burial types and associations have been recorded. This aspect of the regional archaeological record is by far the best known. As noted previously, 26 bluff-top mounds have been excavated in the Sac River basin in Cedar, Polk, and Dade counties (Table 3). These burial mounds occur not only on bluff tops above the major streams such as the Sac and the Little Sac rivers, but also are found on secondary tributaries on both the east and west sides of the two major streams.

The variability in types of burial interment, construction methods, grave goods, and other features of these burial mounds is impressive (Vehik 1977, 1978). However, due perhaps to an over-reliance on the assembling of trait lists, the use of the Midwestern Taxonomic System, and the limited amount of work in other regional environmental settings, the vast amount of information available is rendered less robust because of the inability to securely relate it to regional phases of settlement-subsistence systems.

In the area of concern here, the Fristoe, Bolivar, and Stockton burial complexes have been defined. However, 12 of the 26 burial mound sites do not fit the criteria for these complexes and thus are unassigned. It is not necessary to reiterate in detail the particular data characteristic of the burial mound sites or of the complexes themselves. For the Fristoe burial complex see Wood (1967:1-128, 1965:73-93), McMillan (1968a), Vehik (1977:123-132), and Chapman (1980:93-99); references for the Bolivar complex include Wood (1965:8-72, 1966:3-68) and Chapman (1980:150-152); and references for the Stockton complex include Wood (1965:94-133, 1966), Chapman (1980:150) and Pangborn (1966).

The three burial complexes are basically the same in that they consist of small circular to rectangular mounds of limestone slabs placed over burials laid on exposed bedrock or set within burial chambers. In most instances, multiple burials occur within the mounds, but in the Stockton burial complex single cremations also occur (23P0301 and possibly 23DA237) (Wood 1965; Chapman 1980). Cremated and unburnt broadcast (e.g. Wood 1967:112) burials are common, while bundle, cremation, and primary flexed and extended burials were also practiced.

Basically utilitarian objects like projectile points, other lithic tools and debris, ceramics, and foodstuffs were associated either with the burials or with the construction of the mounds themselves. Conch shell and marine snail shells from the Gulf Coast, including Marginella and Olivella, were the most frequent grave goods. In many cases, the number of beads associated with burials from a single Bolivar or Stockton complex mound outnumbered the total number of beads from all the Fristoe burial mounds combined in the Pomme de Terre (Wood 1967:Table 1).

Only a few burial mounds have been C¹⁴ dated. The Divine Mound (23DA226) of the Bolivar complex is dated A.D. 1110 \pm 75 and A.D. 1465 \pm 90 (Wood 1976b). Site 23CE152 of the Bolivar complex is dated A.D. 390 \pm 140; the Umber Point Mound (23CE148) dates A.D. 1000 \pm 120; and the Sorter Mound (23CE150) dates A.D. 1090 \pm 110 (Chapman 1980:269-271). Chronological estimates have been primarily based on ceramic and projectile point types. The Bolivar complex is considered earlier than the Stockton complex since smooth limestone ceramics and Scallorn points were more common in the former, while shell-tempered pottery and Cahokia points (multiple notches) associated with the Stockton complex are considered later in time and belong to the Mississippian period.

While in many instances it is possible to segregate the burial complexes by temporal period, it is also fair to state that considerable overlap exists not only within the respective burial complexes but between them as well. Vehik's analysis of the Fristoe complex indicated that there was internal temporal variability within the complex (Vehik 1977:128). Importantly, "present evidence supports the hypothesis that individual mounds and cairns were constructed in a single operation (Vehik 1977:125)." Such being the case, it should eventually be possible to arrange temporally all of the burial mounds within the tradition represented by the complexes irrespective of their inclusion in separate complexes. The co-association of cord-marked and smooth shell-tempered sherds with limestone-tempered sherds in the Bolivar (23DA225, 23CE152) complex, and in the Stockton complex (23P0300, 23DA219), combined with the frequent co-association of multiple notched Cahokia arrowpoints with corner-notched Scallorn arrowpoints in the two complexes, supports temporal continuity and overlap of the two burial complexes.

Bolivar complex burial mounds occur on both the Sac and Little Sac

ivers, while Stockton complex mounds occur about midstream on the Little Sac River. The Fristoe burial components identified in the Sac River basin are more divergent in a quantitative sense than the remaining components, separating into different factors than the 18 components in the Pomme de Terre Basin, the primary difference being the presence of sand- and limestone-tempered ceramics in the Sac River Fristoe components. Based on quantitative trends represented in the Bolivar components (Wood 1966:Table 1), the Fristoe complex Broyles and Clemon mounds on the Sac River really cannot be differentiated from Bolivar components in the Sac River basin.

Burial programs differ between the Sac and Pomme de Terre basins spatially and temporally. First, there are significantly higher numbers of burials per mound in the Bolivar (11 individuals per mound, with a range of 3-20) and Stockton components than in the Fristoe components, and the frequency distributions are also different (Table 5). Flexed and extended primary burials are almost totally absent in the Fristoe components, but occur in 9 of the 14 Bolivar and Stockton component burial mounds (Wood 1965, 1966, 1967).

Table 5
Frequency of Individuals Interred at Burial Complexes,
Pomme de Terre and Sac River Basins

RANGE BY MOUND							
INDIVIDUALS:	1-3	4-6	7-9	10-12	13-15	16-18	19-21
Bolivar	1	1	1	3	1	1	1
Fristoe	8	6	7	3	1		
Stockton	1	1	1	1	1		
Nemo	2a						

a = after Wood 1961

The differential quantities of grave goods within the three burial complexes strongly suggest not only internal hierarchies and ranking, but different positions with respect to the availability of Gulf Coast trade items (Table 6). Gulf Coast beads and conch shell gorgets and disk beads were present in higher frequencies in the Bolivar and Stockton complexes. It has been suggested that conch shell gorgets were traded from the Cad-doan area, perhaps along with the Spiro Engraved bottle from the Eureka mound (Pangborn 1966; Wood and Pangborn 1968a, Ward 1967); the Spiro phase again would be the logical choice for the distribution center of these items (e.g. Phillips and Brown 1978).

Horticultural products, corn (and squash) especially, were ubiquitous at Bolivar and Stockton components, but were absent from all Fristoe

Table 6

Mean Frequency of Grave Goods by Number of Mounds¹

	ceramics ^a	dart points	arrow- points	locally available beads	Gulf Coast beads
Fristoe F1 ⁴	12	22	26	3.5	7.4
F2	3	4	12	1.3	1.3
F3	1.3	3.3	3.6	3.6	3
F4	--	16.5	6	4.8	0.2
F5	34	32	13.5	6	13
Bolivar	64 ³	4	12	64	15
Stockton	23 ³	1	7	114	128
Nemo	97	0.5	4.5	4	16 ²

a = sherds

1 = After Wood 1966:Table 1; 1967:Table 1; Wood 1965

2 = Others present, but not quantified (Wood 1961:20)

3 = Not including whole vessels

4 = F1 = Factor 1, after Vehik 1977

components (Wood 1967:117). Nuts and seeds (Chenopods) were also present at these burial mounds, along with woodland and prairie faunal species. Beyond the fact that horticultural crops were known to the people who constructed the burial mounds, it is not possible to determine whether the crops were actually grown in the area or were obtained in trade. No maize has been recovered from open village sites in the Sac River basin. Tobacco may well have been procured or grown at the same time, judging from the frequency of clay and stone pipes recovered in the Sac River basin. Tobacco, however, did not reach the East until sometime after the Late Woodland period (Ford 1981; Yarnell 1976).

There were regional differences in mortuary practices between the Pomme de Terre and Sac River basins, probably of both temporal and functional natures. At some point in time, the Fristoe complex was contemporaneous with both the Bolivar and Stockton complexes, and the Nemo complex (Wood 1961:95-6; Chapman 1980:152) was certainly contemporaneous with the Stockton complex. While the same artifact types are generally present at all of the burial components, there are qualitative (e.g. Vehik 1977) and quantitative (Table 6) differences that support the inference of inter- and intra-regional changes in mortuary complexity. The Sac River basin burial components participated to a much greater extent in the exchange of Gulf Coast items, such as conch and Marginella, than their more easterly counterparts, while intra-regional differences in the quantity of such items in the Fristoe complex seem to be primarily

temporal. The utilization of beads for grave goods increases through time, and if inferences about probable contacts with Spiro phase groups are correct, then this would be during the time period ca. A.D. 1200-1350. The placement of cultigens with burials was certainly more important in the Sac River basin, but it has not yet been determined if these plants were locally grown. More detailed studies are necessary to fully define the burial programs within the prairie-border area, particularly internal hierarchical and/or status differentiation. It is possible that the increasing differentiation in type of burial interment and the frequency of individual primary burials in the Bolivar and Stockton complexes are directly related to their trade position with respect to Gulf Coast goods, and possibly horticultural products as well, when compared to the Fristoe and Nemo complexes.

Floodplain and Open Sites

Investigation of prehistoric settlement and exploitation of resources in the floodplains of major streams and tributaries in the prairie-forest border is of primary importance to this project because the three sites to be investigated are situated on floodplain topographic features in the Sac River Valley. Only limited study of the nature of bottomland utilization in the Sac River basin has been conducted to date, with only four sites (Table 3) receiving extensive investigations.

It is important to note four important features of the bottomlands along the major streams in the Sac River basin:

1. They have undergone extensive Early Holocene floodplain aggradation (Rodgers alluvium) (see Haynes 1976:59; Kay 1978:4-50; Brackenridge 1981).
2. Both the Sac and Little Sac rivers originate in the Ozark Highland and receive some of their flow from springs, particularly the perennial springs in Lawrence and Greene counties (Vineyard and Feder 1974:Figure 72); stream flow is relatively dependable.
3. The bottomland forest habitats are less affected by shifting climatic conditions than upland and slope habitats, and hence are more stable.
4. In terms of potential food resources, both animal and plant, the bottomland forests, aquatic niches, and bottomland prairies combined far outrank the other habitats of the region (F. King 1978a:Figure 2-26).

All of the features in combination would seem to indicate that the bottomland habitat not only will be expected to be the primary focus of settlement-subsistence systems, but that the major proportion of sites will occur there. Nevertheless, even though these major streams of the prairie forest border were diverse in resources, they were not nearly as complex or productive as major streams such as the Missouri, Illinois, or Mississippi farther east in the Woodlands (e.g. Roper 1978, 1979a). Roper suggests that the western Ozark streams such as the Osage and

Pomme de Terre were "incapable of producing sufficient quantities of major economic resources to support other than a small population . . . (and) not capable of supporting an increasing population" (Roper 1979a:10). While the comparison of projected nut yield differences between prairie-forest border streams and the Illinois River Valley made by Roper might be exaggerated, because of mast quantification errors (e.g. Asch and Asch 1978:315), the argument of less diversity is reasonable. Whether the lack of large village sites in the western Ozarks is more a result of limited investigations than for the reasons suggested by Roper, it does seem evident that large Woodland or Mississippi period habitation sites in the prairie-forest border are rare and include only Oneota phase and Loftin phase (Chapman 1980) settlements in the Missouri and White River basins, respectively.

The earliest recognizable archaeological components in the Sac River basin floodplain include Early Archaic and Dalton (Horizons 9-11) components at the Montgomery site (23CE261). This site is the only archaeological site within the Sac River basin presently on the National Register of Historic Places.

The Montgomery site is actually a series of overlapping occupation areas of small size which are buried from 2.4 to 4.0 meters below the present ground surface in Rodgers alluvium (Collins et al. 1977). Dalton projectile points, in all stages of resharpening (e.g. Goodyear 1974), were present, along with adzes, drills, and scrapers, in occupation areas ca. 10 to 15 meters in length. Rice Lobed and Cache River (Big Sandy) points occur at the top of the buried soil horizon, while a variety of Horizons 9 and 10 projectile points are present from 3.2 to 3.7 meters below the surface. Burlington and Chouteau cherts were extensively utilized, and a possible example of Pitkin chert was present on one Hardaway form.

Middle and Early Archaic projectile point forms were recovered from six components in the Downstream Stockton survey (see Roper 1977:Table 5), and from a limited number of sites in Stockton Reservoir (Chapman et al. 1963:15-18, 60, 62, 63, 64), all on Sac and Little Sac River terraces or floodplain knolls. No identified components of this period have been excavated in the Sac River basin.

Two of the Middle Archaic components identified by Roper (1977:81-85) have been identified as base camps because they contained a large number of bifaces, scrapers, other lithic tools, and evidence of most lithic tool manufacturing activities. One of them, 23CE235, was investigated as part of this project; a primary focus of that work (see below) was to document the temporal and functional context of that occupation. Limited activity sites (i.e. narrower ranges of tool types and debris classes) were also suggested to be part of the Middle Archaic settlement system in the Sac River floodplain (Roper 1977).

The concentration of "base camps" in the Sac River floodplain during the Middle Archaic is argued to be the result of a more intensive utilization of bottomland resources during the Hypsithermal interval (Roper 1977). In such a situation, it seems that this change in procurement strategies is reflected in settlement pattern shifts, whereby, as the temporal and spatial incongruity in resources increases, residential bases are placed at locations designed to reduce distances to critical resources (Binford 1980:12). The residential bases have not only a wide range of activities conducted on them but also a high degree of activity redundancy. Limited activity loci would represent not only a narrow and perhaps different range of tool uses/activities, but less reoccupation of these spots.

Late Archaic settlements (especially Horizons 2 and 3 occupations) are dispersed not only along major streams but are also on tributary creeks like Turnback Creek and Bear Creek, as well as in uplands, caves, and in a maximum number of settlement situations. Two Late Archaic components have been excavated to date, 23DA231 on Sac River, and 23DA223 on the Little Sac River (Wood 1965:179-183). No occupational features were recorded in the limited testing conducted, but a wide variety of tool forms, suggesting food processing, procurement, and refurbishing activities, are indicated. No hearth or rock features like those recorded at Phillips Spring (Kay 1978; Kay et al. 1980) are known from the Sac River basin.

The inferred Late Archaic settlement pattern along the Sac River between Stockton Dam and Caplinger Mills is a bipartite division of sites on the floodplain. Sites along the base of the bluff evidence a greater variety of activities than do the sites situated well out on the floodplain and along the bank of Sac River. However, the problems of multiple components and site reoccupation on the alluvial terraces do not permit completely accurate characterization of site lithic assemblages except in more than a general way (Roper 1977:86-90). This diversification in settlement locations indicates a subsistence strategy similarly diversified, or at least the development of a more residential (cf. Binford 1980:9) or nomadic settlement pattern. It is not known whether similar differences in settlement patterns exist on the Little Sac River or on the tributary creeks.

During the Late Archaic a most significant innovation in subsistence strategies took place--the cultivation of cucurbits and bottle gourds (tropical or Mexican cultigens) at Phillips Spring. This strategy has been dubbed the Early Eastern Mexican Agricultural Complex (Ford 1981:8-9). As Ford indicates, this Mexican crop complex "was introduced by diffusion from band to band and was grown in gardens as a complement to a pre-existing hunting and gathering economy based on climax forest products (Ford 1981:8)." Both squashes and gourds were used for food (seeds) as well as for containers (Kay et al. 1980:816-7).

The squash and gourd zone at Phillips Spring is dated ca. 4260 B.P., at least 1000 years prior to the gathering and probable cultivation of native oily and starchy seeded plants like Iva sp., Chenopodium sp. and Helianthus sp. (see Chomko and Crawford 1978, 1979). Other native plant foods found in Late Archaic context at Phillips Spring included grape, plum, smartweed, blackberry, hickory, black walnut, oak, and hazelnut (F. King 1980:Tables 2 and 3). Squash and gourd were cultivated from the Late Archaic to the Early Mississippi (Falk 1969:77) in the Pomme de Terre basin. It is a reasonable supposition that there are, or were, sites around springs in the Sac and Little Sac valleys that will be similar to Phillips and Boney springs (F. King and McMillan 1975) in terms of the presence of Mexican and native cultigens and wild plant foods. At present, only corn and squash have been recovered in the Sac River basin, but in Woodland and Mississippi period occupations. Ford notes that (1981:15-16): "Corn was present in the East sometime after 500 B.C. . . . introduced from the Southwest across the southern Plains and into the Midwest riverine area."

The prairie-forest border of southwestern Missouri would seem to be situated along convenient transportation avenues, above the Neosho, Illinois, and White River drainages that connect with the Southern Plains and the Mississippi Valley. Kay et al. (1980:820) suggest that gradual down-the-line exchange was responsible for bringing cultigens into the interior highlands of Missouri.

As previously discussed, the Woodland period in the Missouri Ozarks is difficult to subdivide into the tripartite division of Early, Middle, and Late, using traditional classifications in eastern North America. Except in a few instances where diagnostic stylistic motifs are present (i.e. zoned punctates, rocker stamping), indicating Middle Woodland period occupations or C¹⁴ dates falling during that period, most ceramic sites in the Sac River basin are usually classified as Late Woodland. In an attempt to circumvent this limiting factor, Roper (1977:90) has divided Woodland sites into two groups. The first group is characterized by Horizon 1 projectile point (Rice side-notched, Scallorn, Langtry, and Gary), while the second group is characterized by small arrowpoint forms. In the sample of sites from the downstream Stockton survey, these projectile point groups were apparently mutually exclusive. More intensive investigations at a variety of sites suggest a considerable overlap of the two groups, particularly at the bluff-top mounds and the open village sites. One problem with this division is the inclusion of triangular, Cahokia, and Young points in the Woodland period when it is apparent these also occur in the Mississippian period (Chapman 1980).

Woodland period sites within the Stockton Reservoir survey area have the same spatial distribution as Late Archaic period sites. That is, Woodland sites are present on both major and minor streams. Small villages, along the Sac and Little Sac rivers, Flycatcher (23CE153), Dryocopus (23CE120), and Shady Grove (23PO309), have been investigated previously (see Chapman 1980:83-87 for a synopsis), and scattered evidence of Woodland occupations was present in the other floodplain sites excavated in Stockton Reservoir (Wood 1965:179-183).

A limited series of C¹⁴ dates are present, but they are particularly unilluminating: A.D. 715±95 and A.D. 1390±100 from Flycatcher and A.D. 1475±100 for Dryocopus. The artifact assemblages, however, suggested that dates of ca. A.D. 850-1050 probably were more appropriate (Calabrese et al. 1969; Pangborn et al. 1971; Ward 1968). Both Flycatcher and Dryocopus were non-ceramic sites, pointing out again the relative unimportance of ceramic vessels except as storage containers in rock shelters and caves, and as grave goods in burial mounds, in Woodland and/or Mississippian sites in the prairie-border region. Limestone-tempered, smoothed and cord-marked pottery was recorded from the Shady Grove site in association with Reed side-notched and Cahokia side-notched arrowpoints (Huffaker notched; cf. Chapman 1980:308). A similar assemblage from the Sorter Mound was dated at A.D. 1090±110 (see above). Reed projectile points seem to date to both the Harlan (A.D. 1000-1200) and Spiro phases (A.D. 1200-1350) of eastern Oklahoma, while the Huffaker points belong to the Spiro phase (Brown 1976:104, 109).

Small circular pole structure houses with adjacent pits were excavated at Dryocopus and Flycatcher, and a portion of a structure was exposed at Shady Grove. These sites appear to represent relatively short-term occupations by communities of less than 50 people, with estimates of 8 to 10 structures per site (Kaplan et al. 1967). No well-developed middens were present, and the general dearth of refuse supports a short-settlement period occupancy. The lack of associations with pottery at the two sites prohibits more conclusive statements concerning the relationship of these open village sites with the specific burial mound complexes described earlier. The frequency of Gary and Langtry points in open village sites, but contrary evidence from burial mounds, is one main roadblock. Nevertheless, it is clear that the two site types are approximately contemporaneous, and if the late C¹⁴ dates from Dryocopus and Flycatcher are incorrect, then their association with the

earlier components of the Bolivar complex is probable, while the Shady Grove site would seem to be associated with the latter portions of the Bolivar complex.

In the Downstream Stockton survey, the apparent settlement pattern during the earlier portions of the Woodland period consisted of (1) small villages or base camps, situated centrally with respect to floodplain and upland resources on alluvial terraces, and (2) special-purpose or limited-activity loci at various topographic positions or niches within the floodplain (Roper 1977:91-94). The small villages have assemblages analogous to the Flycatcher and Dryocopus village sites which are farther upstream on the Sac River (e.g. Calabrese et al. 1969).

During the latter portions of the Woodland (and Mississippi) period sites were located along the base of the bluffs and in different locations within the floodplain (Roper 1977:95-96). In no case were the lithic assemblages at these sites suggestive of other than small activity sites, presumably food procurement and hunting activities.

Tropical cultigens continued to be utilized during the Woodland period, based on evidence from the Pomme de Terre basin. A storage pit from Boney Spring (King and McMillan 1975; Wood and McMillan 1976:99-103) dated ca. A.D. 50, had domestic squash, dogwood, elderberry, ragweed, pokeberry, and wild plum plant foods in association. The Woodland component at Phillips Spring, dated between 300-80 B.C. (Kay et al. 1980:812), contained a similar range of wild plant foods, plus bottle gourd, and a variety of hardwood nuts. Squash seeds increased in size through time, a process expected where the seeds were being used as a food source and the larger seeds were selected for planting (Kay et al. 1980:816-817). It does not appear at this early date that more intensive utilization of native plants or tropical cultigens occurred in the prairie-forest border. Cultigens continued only to augment the basic subsistence strategy which relied on a broad spectrum of native animal and plant resources (e.g. Ford 1980).

No corn has been recovered from open floodplain sites during the Woodland or later periods. However, if the date of A.D. 390±140 from the Bowling Stone Mound (23CE152) is reasonable, maize was being raised or obtained by this time period. The large quantities of maize left as grave goods or offerings in the Stockton and Bolivar complex mounds can only suggest ready access to this horticultural product. Dates of A.D. 1100 on later burial components with maize offerings point to a long time period when maize was grown in the area or procured in exchange.

The temporal and spatial contexts of settlement in the Sac River basin are summarized in Table 7. The Sac River basin was utilized for over 10,000 years of prehistory and periods of change and stability in the archaeological record seem to be well represented. The overall investigatory emphasis on bluff-top burial mounds in the region has contributed a wealth of data concerning social organization, burial practices, and exchange relationships in the Woodland and Mississippi periods. However, commensurate data from other regional contexts are still forthcoming and, therefore, the development of a comprehensive synthesis of human adaptations in the prairie-forest border of western Missouri is not possible at the present time. This is particularly the case in bottomland/floodplain habitats. There the record is not only long and varied, but, under certain circumstances and with adequate temporal controls, promises to contribute data that will provide a more

Table 7

Summary of Settlement Patterns in the Stockton Reservoir
Area by Topographic Landforms

	Caves/rock shelter	Blufftop/upland	Floodplains
Dalton			x
Early Archaic	x		x
Middle Archaic			x
Late Archaic	x	x	x
Woodland	x		x
Late Woodland	x	x	x
Mississippi	x	x	?
Historic Indian		x	x

balanced view of the mundane, but substantial, aspects of the regional archaeological records.

Chapter V

RESEARCH OBJECTIVES

The major goal of the testing program at the Sac River sites was to gather sufficient data to evaluate the sites in terms of the criteria of eligibility for the National Register of Historic Places (36 CFR 1202 and 36 CFR 1204). These criteria include (36 CFR 1202):

An association with events that have made a significant contribution to the broad patterns of our history.

That are associated with the lives of persons significant in our past.

That embody the distinctive characteristics of a type, period, or method of construction; that represent the work of a master; that possess high artistic values; that represent a significant and distinguishable entity whose components may lack individual distinction.

That have yielded, or may be likely to yield, information important in prehistory or history.

To accomplish this goal information was gathered relating to the management and research potential of the sites. That is, the project data recovery plan pertains to: 1) the structure, content, and integrity of the archaeological sites, and 2) the development of several research problems relevant to regional concerns and pertinent to the data to be recovered (36 CFR 1210.2). The combination of the two procedures should ensure that both research and management needs can be met.

Structure, Content, and Integrity of the Archaeological Resources

The determination of site significance, in part, rests upon the basic evaluation of its character, i.e., its integrity, structure, and content (Advisory Council on Historic Preservation 1980:16; see also 45 FR 78808). Integrity refers to the nature and condition of the archaeological deposit, and includes information on whether the deposit is disturbed, undisturbed, well-preserved, or not preserved. Structure of the archaeological deposit has been defined as the spatial patterning of artifacts, structural remains, features, and archaeological strata, and the association between these elements on both the intra-site and inter-site scales (cf. South 1979:220-221). Content refers to the elements of the archaeological record present at a site; elements included are the artifacts, structural remains, features, etc. (South 1979:220-221). A basic assumption employed here is that the relative information potential of archaeological sites rests with the condition and relationship of these elements in the archaeological record since these variables express the potential the site has to yield significant information.

Research Problems

In a time when the archaeological profession is being evaluated seriously by the Federal government in terms of relevance (i.e. scientific value) and the efficiency and cost of research (Comptroller General 1981), it behooves us to make maximally efficient utilization of state preservation plans (if they exist), and to develop relevant research questions. That is, the development of relevant research questions, significance, and the planning of research should relate to the development of State Historic Preservation Plans (see T. King 1977; McGimsey 1979) as specified in 36 CFR 1201 and Section 102 (a) (2) of the National Historic Preservation Act of 1966.

As T. King et al. state (1977:102):

One function of a state historic preservation plan should be to define the kinds of data necessary to address research problems of both national and local significance, and to derive from this classification a guide to types of properties whose data content should be preserved in various ways. The plan should not only consider those questions now being addressed by scholars; it should also give attention to the probability that other questions will be asked in the future, and attempt to define the kinds of properties and data that should be preserved to maintain the likelihood that such questions can be fruitfully addressed. Thus, it should, in a sense, preformulate the questions to be asked about any given historic property in defining its significance.

Missouri has yet to formulate and complete a document addressing the management of state archaeological resources or the planning process stating objectives, goals (MAPA 1980: Preamble), or their implementation. With the increased involvement in the planning process comes a greater need and responsibility in the management of archaeological data. To do so, the archaeologist must be in a position "to rapidly and effectively summarize and present . . . current knowledge of archaeological resources . . . to the planners" (Scholtz and Million 1981:16). Obviously the two objectives go together to provide the most accurate and relevant basis for assessments of site significance.

In lieu of research problem recognition with reference to the State Historic Preservation Plan, research problems were selected that appeared to be representative of research interests for the regional area (e.g. Schiffer and Gummerman 1977:131); problem-oriented research seems to provide a suitable approach to the evaluation of archaeological resources (Raab and Klinger 1977, 1979). A review of the archaeological literature for the prairie-forest border (Chapter 4) indicates that current emphases on settlement-subsistence changes have superseded earlier interests which were dominated by concern with culture-history sequences and Woodland mortuary activities. Substantive research problems will be addressed (cf. Grady 1978).

Location and Settlement Choice

The explanation of settlement pattern change and stability is dependent upon the relationship between a site and its natural and cultural environmental

setting. Just as the study of human choices for settlement are variable, so too are the means by which humans adapt to the natural and cultural environment. Changes in adaptive strategies (i.e. dimensions of settlement-subsistence; social and mortuary dimensions; technological and functional dimensions, etc.) are conceived of as a selective process dependent upon the acquisition, management, and distribution of energy within a society. Selection is made by evaluating the relative costs and benefits of alternative settlement-subsistence strategies (e.g. Earle 1980:1-29). Those strategies or sets of strategies that are more efficient, i.e. have lower unit costs and/or higher energy returns relative to other strategies, and vary in the directions favored by the local environment, will generally be maintained in future generations so long as they remain most efficient. These strategies have clear functional costs in energy expenditure and procurement.

The settlement pattern model proposed for the Downstream Stockton area (Roper 1977:75-96) will be evaluated. Critical to the evaluation of the model is the nature of settlement at different kinds of sites, expressed as diverse and functionally variable base camps and limited and more specialized camps or activity loci. Particular attention will be centered on the Woodland period (Roper 1977:96) as all three archaeological sites that were tested seem to date exclusively to this period.

Roper's model has been outlined in Chapter IV. To summarize: larger more sedentary base camps or villages are present near the river, while limited activity loci are dispersed in different positions within the floodplain of Sac River. The limited activity loci functions are directly related to their position within the floodplain as determined by the site catchments and distribution of critical resources as well as the season or seasons of occupation.

A consideration of the variables influencing site locational choices is dependent upon the role of particular activities and their functions within a larger cultural system. If prehistoric populations carried out different tasks at different locations, assessments of site function and settlement location must consider the relationship between sites in a specified set of sites. For example, in a fairly nomadic or residential type of settlement pattern, the consumers continually move to new sources of food, and the different areas settled are marked as residential bases. More particular extractive camps are termed locations (e.g. Binford 1980:9). The identification of a specific site "type" is dependent upon the identification of other site types if the relationships between the sites are to be clarified and spatially and temporally integrated. This objective is truly a regional one (cf. Binford 1964:426), but it is also more specific. That is, sites that occupy the same continuous stretch of bottomland, for instance, and are occupied contemporaneously, allow for the investigation of settlement patterns at a smaller scale, with a concomitant increase in the possibility of reconstructing components of the settlement patterns and the range of "community" activities. Site catchment analysis is at an even smaller and more localized scale [territory] (Roper 1979b:124; Styles 1981), that of a particular site.

The settlement strategy for the Woodland period can best be described as a collecting or logistical strategy (Binford 1980:12). In this strategy, residential bases (base camps) are placed at locations designed to reduce distances to a series of critical resources and are focal points of activities. Food resources are collected by task specific

groups who bring the foods back to the residential bases. Limited activity loci are the sites generated by the task-specific groups.

The logistical settlement pattern is predicted to be more common in areas with marked seasonal changes, growing seasons of moderate length, and temporal and spatial incongruity in resources (Binford 1980), all three being natural characteristics of the prairie-forest border.

The identification of limited activity loci is critical in the testing of the Roper model. Expectations include: a) minimum functional redundancy between limited activity loci (different activity sets); b) low diversity in site artifact assemblages; c) significantly different catchment areas between different classes of activity loci; d) incomplete and selected portions of tool manufacturing and maintenance strategies (e.g. Raab et al. 1979); e) localized utilization of raw materials and resources, for example, significant differences in the procurement of lithic raw materials or seasonal occupations; f) low density site content; g) little or no evidence of structural remains or suggestions of permanency.

Assuming that procurement strategies at limited activity loci were aimed at the exploitation of bottomland and/or upland resources, it is anticipated that some or all of the characteristics delimited above will be identified in some discernable fashion. Only those activities are outlined which could be recognized in the archaeological record, given the preservation conditions in the Sac River floodplain. Subsistence strategies cannot be directly addressed because the needed subsistence data is not forthcoming.

Nature of the Lithic Assemblage: Functional and Technological Considerations

Only lithic artifacts were recovered from the three sites excavated in the below Stockton Dam study area on Sac River. The purpose of the lithic research design was twofold. The first objective was to identify the range of assemblage variability and the technological and functional differences between the sites under consideration. Answers to specific questions were sought:

What is the nature of the artifact assemblage, and what evidence of functional/technological variability is present?

What raw materials were selected for particular tasks? Where are their sources and how were they utilized?

What tool manufacturing and maintenance strategies were utilized?

The technological and functional data were oriented so that probable functions and activity sets were emphasized as the basic unit of classification (cf. Odell 1980:428). The primary assumption was that there is a relatively direct relationship between lithic assemblages, subsistence strategies, and, hence, settlement types, and locations; thus, the character of lithic assemblages will likely vary in relationship to synchronic and diachronic changes in settlement and subsistence practices (e.g. Davis 1978).

The classifications devised here are used to characterize site archaeological content and function. The morphological classification describes tool and debris forms, and develops morphological/technological arrays of manufacture, reduction, production, and maintenance of stone

tools to correlate with hypothesized site functions (Raab et al. 1979). In other words, these categories deal with the full range of activities involved with stone tool production, from the procurement of raw materials, the processes involved in tool manufacture, and the relationship of specific tool categories to inter-assemblage variability and function.

The morphological classification presented here is an amalgamation of the class definitions of House (1975), Ahler and McMillan (1976), and J. Price and C. Price (1981), with additional information as provided in Henry (1978). Twenty-five morphological classes are utilized; these classes are listed and defined in Table 8. Tables 9 and 10 are interpretations and correlations of particular morphological attribute states with specific and general functional and/or behavioral characteristics.

Concern focuses on the implications and eventual explanation of functional and technological variability within and between archaeological assemblages comprising the local settlement-subsistence system. The nature of the material cultural assemblage present at a site reflects both the nature of the activities performed there and its function in the settlement system. The inferred parameters in Tables 9 and 10 are based upon an extensive background literature in material culture uses, ethnography and ethnoarchaeology, replication, experimentation, and specific archaeological associations (e.g. Ahler 1971; Gould 1978; Hayden 1979).

The types of lithic raw material utilized at the sites reflect more than simply access or ease of procurement. They also reflect preferences for particular lithic resources and preferences for particular lithic raw materials for producing certain kinds of artifacts. As a basis for discussion of possible tool uses and their relationship with particular raw materials, it is necessary to consider the general properties of the lithic materials in relation to probable uses and ranges of tasks inferred for each class of stone tools. From this consideration basic correlations can be established between artifact classes and the different raw materials, and explanations about the processes of raw material selection and utilization can be offered. Observed changes or differences in raw material preference between sites are hypothesized to be primarily a result of: 1) procurement efficiency--locally available materials will be preferred if the raw material is suitable to the planned tasks, and 2) mechanical efficiency--different properties of the raw materials, including edge-holding properties, consistency and ease of flaking, coarseness, etc., were selected for certain tasks or ranges of tasks. Utilization of non-local raw materials would suggest participation in extra-local exchange networks and transportation of lithic raw materials from other areas.

Lithic manufacturing and maintenance processes are potentially informative about lithic technology. Changes or differences in lithic technologies between sites can be the result of both temporal and functional dimensions. Temporally, changes from a bifacial tool industry (Archaic) to a core/flake tool industry (Woodland) should be evident with the changing emphasis in lithic tool production from large bifacial tools to small flake tools like arrowpoints. Within a particular temporal horizon, patterned differences in the stages of manufacture and maintenance present at each site reflect site functional variability (Raab et al. 1979):

1. All stages of manufacture and flake sizes will be present at residential sites, including cores, primary-tertiary debris elements, unfinished tools, and discarded tools. Discarded tools will include an even range of tools broken through use and manufacture.

Table 8

Morphological and Technological
Classification of Lithic Artifacts

Flake

primary element	those elements which exhibit dorsal (obverse) surfaces that are entirely covered by cortex
secondary element	those elements which exhibit both cortex and flake scars on the dorsal (obverse) surface
tertiary element	those elements which exhibit a totally flaked or non-cortex dorsal surface
bifacial thinning element	elements removed during the thinning of a biface. The edge of the flake nearest the bulb of percussion exhibits part of the biface edge. The platform angle is usually low, with wide shallow flake scars on the back of the flake which was the original surface of the biface

Core

pieces of raw material from which most of the original surface has been removed by flaking

Biface

thick biface	bifacial pieces without well-defined working edges and/or zones of utilization modification on edges or faces. These artifacts are generally thicker than 10 mm.
thin biface	bifaces with well-defined working edges; specimens of ovate, oval, circular, triangular, or rectangular shape. These artifacts are generally thinner than 10 mm.
projectile point/ hafted cutting tool	any symmetrical or slightly asymmetrical pointed biface generally greater than 2 cm in length with hafting modifications, and fragments unmodified subsequent to breakage

Table 8 (continued)

hafted transverse end scraper	a modified hafted biface exhibiting a transverse working edge usually retouched from one side. This edge is usually convex
arrowpoint	small (generally less than 2 cm in length) bilaterally symmetrical artifact with pointed distal end and some facility for hafting at the proximal end
Unifacial Scraper	a thick piece with the end, usually opposite the bulb of percussion, unifacially chipped to produce a convex and sometimes straight working edge
Steeply Retouched Uniface	flake with steep marginal retouch on one face forming a straight, convex, or slightly concave working edge
Spokeshave	piece with steep unifacial retouch forming a pronounced concave working edge
Graver	the presence of a small, pointed, unifacially flaked spur on the margin of a flake exhibiting modification indicative of straight rather than rotational use
Perforator/Drill	bifacial tools with steep marginal retouch creating an elongated specimen which exhibits wear on the tip attributable to a circular drilling motion
Adze	medium or large bifacial tools with evidence of use modifications such as step fractures and polishing
Hammerstone	modified cobbles or cobble fragments exhibiting marginal pecking or battering
Anvilstone	cobbles with battered radial or V-shaped cavities in a flat surface
Split/Tested cobble	cobbles which have been split and from which one to only a few marginal flakes have been removed, and no other modification

Table 8 (continued)

Pitted Cobble	cobbles with small, smooth, circular, basin-shaped depressions on a flat surface
Ground Cobble	cobbles which exhibit face and edge grinding
Shaped Cobble	cobbles exhibiting circular and uniform grinding over most of or the entire surface, usually creating a circular or rectilinear, tabular artifact
Grooved Abrader	tools with one or more narrow grooves ground into them
Mortar	large stone slabs that exhibit large, circular concave depressions in one or both faces
Burned and Fire-Cracked Rock	rock fragments which exhibit evidence of being heated and broken

Table 9

Probable Function of Artifacts in Sac River Basin Sites
(after C. Price 1981:Table 12-2; Cook 1976)

Artifact Class	Function/Activity
projectile point/knife	projectile (dart, arrow) point; piercing, cutting, sawing
thin biface	cutting, sawing, light chopping, preform
thick biface	preform; cutting, sawing, chopping
uniface	cutting, scraping, (preform)
bifacial/unifacial scraper	hide preparation; bone and woodworking; scraping
graver	scoring, incising; bone and woodworking
drill/perforator	drilling, reaming, piercing
spokeshave	wood or bone shaft scraping and smoothing
hammerstone	pulverizing; lithic working
pitted cobble	possible nut preparation; pulverizing
ground cobble	grinding, smoothing; lithic tool working (biface and core platform edge preparation); possibly as food processor
shaped cobble	possible handstone (mano) for basin mortar and food processing; abrader
mortar	food preparation
utilized flakes	sawing, cutting, shredding
core/split and tested cobble	raw material for flake and bifacial tools; also used for pulverizing, chopping
primary element; non-utilized	by-product of primary lithic reduction
secondary and tertiary elements, biface thinning flake; non-utilized	by-product of secondary lithic reduction and tool maintenance
hematite	pigment
fire-cracked rock	hearth, oven or stone boiling

Table 10

Activity Sets and Cultural Features in the Archaeological Record
(after C. Price 1981,; Cook 1976; Kay 1978)

Activity Set	Selected Artifacts and Cultural Features
wood/bone working	scrapers, gravers, spokeshaves, adzes, axes, celts, wedges, utilized flakes, drill, gouges
hide working	scrapers, perforators
hunting	dart and arrow points
plant and meat food processing	pitted tool, grinding stone/mano, ground cobbles, metates, choppers, bifaces, utilized flakes
lithic tool production	cores, preforms, hammerstones, ground cobbles, non-utilized flakes (primary to tertiary elements), heat treatment
tool maintenance	biface thinning flakes, secondary and tertiary elements, reworked tool forms
cooking	fire-cracked rock, hearths, cooking pits/ovens, ceramic containers
storage	pits, ceramic containers
pigment processing	hematite processing slab, abrader, pitted stone

2. Smaller flake sizes and a limited range of manufacture stages will be present at limited activity sites, primarily including secondary and tertiary debris elements, few cores, evidence of some tool manufacture occurring elsewhere, and a low frequency of tools broken in manufacture in ratio to those broken in use. Identification of differences in the technological dimension should be obtainable if methods of stone tool manufacture are discernible.

The second objective is to separate temporally discrete components utilizing any and all stylistic classes of objects recovered in the investigations at the three sites. The stylistic classification is a distinct subset of morphological classification, and relates directly to chronological and spatial factors. For lithic materials, only projectile points (and certain bifacial preforms) will be likely to occur in sufficient numbers or show enough variability to be amenable to stylistic analysis. To function as a piercing projectile a projectile point requires only three properties: a) a light body, b) a pointed distal end, and c) some haft treatment at the proximal end. The specific forms these three variables take have stylistic implications. For the stylistic classification of projectile points, stem shape and hafting modifications are particularly emphasized because of the apparent chronological significance of these attributes in the prairie-forest border of southwestern Missouri (e.g. Marshall 1960; Kay 1978). The haft elements are stressed instead of the blade shape because of the considerable resharpening, beveling, and utilization that these areas of the projectile point are subject to (Ahler 1971:Table 55), although patterns of blade modifications can have temporal as well as functional significance. The basic elements of the classifications are:

stem shape: contracting, rectangular-straight, expanding,
unstemmed or lanceolate, indeterminate

hafting modifications: notching, edge grinding, fluting,
barbed, shouldered, none, indeterminate

type of notching: side-notching, corner-notching, basal-
notching, multiple notching, none, indeterminate

The temporal placement of the projectile point style classes is based on Kay's (1978:Table 8-1) analysis of the projectile point series from Rodgers Shelter, approximately 60 kilometers northeast of the study area.

Intrasite Patterns

The activities referred to above have a spatial dimension that reflects the behavioral aspects of function. That is, it is argued that all necessary activities were concentrated and carried out at the residential base sites, while more specialized and different activities were dispersed among many locations at limited activity sites rather than focused at a few. The structure and content of the two "site types" should reflect basic differences in spatial organization as well as in intra-site complexity. Comparisons of spatial patterning at spatially different loci will aid in the investigation of variation in patterning

related to the different functional activities carried out at particular sites, and thus be referable to differences in site function.

Methods of test evaluation are designed to collect information on the entire site area, and to aid where possible the identification of clusters of associated artifacts. It is expected that the analysis of intra-site differentiation of limited activity loci will show a low dimensional character primarily accountable to changes in activities in space and/or reoccupations, or one phase of occupation, either from the surface or subsurface data. The relationship between surface and subsurface deposits can also be tested; i.e. whether surface artifacts and spatial distributions are an accurate predictor of subsurface cultural deposits.

The important aspect of determining and identifying intra-site patterns at this scale of investigation is in demonstrating that intra-site patterns of formal, functional, and structural variability do exist on a general level. A finer analysis, and more spatially intensive investigations, of the materials recovered will yield more data on the site occupation, and refine our expectations about internal site variability. For example, in the analysis of site structure we might anticipate spatial differences between the activities carried out at the site, patterns of trash disposal, technological organization (i.e. artifacts produced on the site vs. artifacts carried to the site; products of consumption and processing), and the basic organization of space. The degree of localization in space of different activities can then be investigated and related to the site-specific archaeological record. This level of spatial analysis is best conducted when more comprehensive excavation and analytical approaches can be carried through, i.e. Phase III investigations.

Chapter VI

FIELD METHODS AND CONDITIONS

The field methods to be utilized in the evaluation of the three prehistoric sites include: 1) controlled, intensive surface collections, and 2) test excavations of noncontiguous 1 m X 1 m squares, totaling 8 meters square at 23CE252, and four meters square at 23CE235 and at 23CE324, respectively. Due to various constraints determined by field conditions, it was not possible to conduct uniform field procedures at each site, nor to follow the scope of work precisely as dictated. Minor deviations from the scope of work were employed to suit the particular situations as encountered at each specific site, when it became apparent that the scope of work could not be completely followed. Prior to their being initiated, these slight modifications in field procedure were discussed and approved by Corps of Engineers staff.

Controlled Intensive Surface Collection

Within the last decade, there has been a significant expansion in the utilization of systematic surface surveys as a means of acquiring archaeological data (Schiffer et al. 1978). Where previously surface data were almost always conceived of as a means to find sites to excavate, with excavation the only way to secure data worthy of detailed analysis, now there is a concern for understanding spatial variability, a shift of the primary focus of investigation from sites to regions, and systematic attention to surface collection data (e.g. Binford 1964). As pointed out by Raab (1978:106), the constraints of contract archaeology have, by and large, forced researchers to utilize these approaches explicitly and systematically when considering the potential of all archaeological remains.

Systematic attention to surface collected data has only become feasible after the development of survey and analytical methods (e.g. computer mapping programs) that brought the cost of data recovery and analysis over large areas within reasonable economic range (cf. Upham 1979). Surface survey data is more cost-efficient than excavation data since excavation recovery techniques are more expensive in terms of data recovery. The combination of the two types of data acquisition leads to the complementary and effective investigation of the archaeological record since it is quite likely that components of regional cultural systems, for instance particular settlement-subsistence locations, cannot be adequately dealt with using only one set of recovery methods.

Based on studies of the processes affecting surface collected data (e.g. Lewarch and O'Brien 1981) it seems clear that tillage processes have not had the deleterious effect on surface artifact patterning that they were once thought to have. General goals of controlled intensive surface collections are:

1. The definition of site boundaries.
2. The definition of intra-site artifactual variation, if present.
3. The quantitative assessment of site artifact assemblages.

4. As an aid in the placement of test units.
5. The isolation of discrete individual cultural components.

It was not expected that the surface collection data from these three sites would be informative in all five aspects, but the characterization of the data in terms of these variables will be one finite and substantive measure of their information potential.

Constraints

Site 23CE252

No controlled intensive surface collection was possible at the R. Pyle site. When the site area was in wheat, and surface visibility was excellent along the crop rows, permission was denied to conduct investigations of any kind. Immediately after the wheat harvest was completed, the site was then put in pasture, so by the time permission to investigate was secured, surface visibility was uniformly poor across the site area. Hay had been harvested recently, but bare patches of ground were limited to less than 2 percent of the site area. No controlled surface collection could be conducted under these conditions. In lieu of controlled surface collection, and as a means to answer some of the general goals of the pre-testing phase, systematically placed shovel test transects were excavated across the suspected site area. This procedure is discussed below.

Site 23CE235

The B. Jones site was either in wheat or soybeans during the two periods the site was examined. Thus, surface visibility was generally excellent wherever the crop was not overly vigorous in growth. However, vegetation in the bean fields was so thick over the northern half of the site that the surface was obscured even in the rows between the plants. This variability in surface visibility precluded a comprehensive and systematic surface collection because it artificially bounded the site/landform and necessarily biased the definition of intra-site spatial variability since only the confined non-representative areas of good visibility on the southern half of the site could be surveyed adequately. Secondly, continual cultivation of the levee on which the site is located has contributed to accelerated erosion of the slope margins of the levee's crest. Clearly, an intensive surface collection of 23CE235 under these conditions would be informative only about disturbance processes and the extent of levee slope erosion (e.g. Wood and Johnson 1978). The quantity of surface cultural material visible on the levee crest was low and hence not suitable for analysis by itself. At the B. Jones site, therefore, a selective or grab sample was obtained to generate a sufficiently large sample size for quantitative assessments. The sample, because of the size, will probably be representative of the type of assemblage present.

To secure the selective sample, a series of crop rows was examined by the crew and, except for fire-cracked rock, all classes of artifactual debris were surface collected, though all cultural material present was not collected. To evaluate the representative nature of the selective surface collection, comparisons will be made with the assemblage gathered from plow-zone and subsurface excavations at the site. The quantification of artifact

densities and frequencies for subsurface deposits can be used to derive expected frequencies of artifact classes on the surface that, when compared with observed surface frequencies, can be utilized to assess unsystematic collections. This will be discussed more fully in Chapter VII.

Site 23CE324

With the permission of the landowner it was possible to examine the J. Jones site while it was in wheat, but prior to harvesting of the crop. Our intent was to minimize the damage to the crop as a result of the pedestrian trampling of wheat during the investigation and at the same time to pursue the goals of the surface collection methodology. A two-stage strategy was formulated:

Stage 1 was to consist of selected surface collection transects oriented along the crop rows, with all cultural material visible on the transects collected and provenienced. The transects were divided into smaller transects that were one crop row in width and 10 meters in length, to obtain a finer measure of horizontal control.

On the basis of the horizontal densities of cultural material within the transects, high density concentrations were to be defined:

Stage 2 was to consist of a few block provenience collection units (i.e. a 10 m X 10 m or 20 m X 20 m block) laid out over a density concentration isolated by the transect surface collection. Only a few were to be collected as a safeguard against crop damage.

However, the Stage 1 survey demonstrated that the density of cultural material was too low to define effectively a concentration suitable for block provenience collection. Within the main part of the surface scatter, the density was approximately one artifact per 6 to 10 meters of the transects, and this density fell off to one artifact per 20 meters at the southern end of the site. On this basis, a 10 m X 10 m block would be expected to contain from 10 to 16 artifacts, and a 20 m X 20 m block to contain 40 to 60 artifacts. Since the entire site could not be intensively surface collected, the amount of information potentially to be acquired by Stage 2 surface collections did not seem to be sufficiently large to answer adequately the types of questions this type of surface collection method is designed to answer (see above). Therefore, no Stage 2 surface collection was conducted. Instead a selective grab sample was collected since such an approach was determined to be the only suitable means, given the constraints, to increase the sample size and the probability of component recognition. No intra-site surface collection data were secured, therefore.

Systematic Shovel Test Transects

The utilization of systematic shovel test transects was confined to the Ronnie Pyle site (23CE252). Because the site area was totally overgrown in pasture, shovel test transects were chosen as the most useful technique available to provide data on general horizontal configuration, artifact density, and a preliminary assessment of artifact content (e.g. Trubowitz 1970). In these respects, shovel test information answered locational management requirements and contributed to other project research goals.

Shovel test transects were aligned in an approximate north-south direction at 15-meter paced intervals. The transects began at the northwest corner of the field and continued generally until topographic conditions changed and/or no cultural material was recovered on transects. Shovel tests within individual transects were spaced at approximately 15-meter intervals.

The shovel tests were 30 to 60 centimeters in diameter and were excavated to a depth of about 30 centimeters below surface. Soil from each shovel test was systematically picked through with a trowel and cultural items recovered from shovel tests were individually provenienced by transect number and shovel test number. Two or more consecutive negative (i.e. no cultural material recovered) shovel tests on particular transects were considered sufficient for determining the general absence of cultural material and for defining the site limits based on the positive shovel tests. Positive shovel tests were temporarily designated with surveyors' flags to assist in determining site size, for mapping purposes, and in marking the site for photographs.

Subsurface Testing

Sites 23CE252, 23CE235, and 23CE324 were tested using a field methodology designed to collect sufficient information to evaluate their significance and potential eligibility for inclusion in the National Register of Historic Places.

Within the minimum excavation standards specified in the contract's scope of work, the purpose of the testing was to examine the nature, content, and structure of the cultural deposits through limited investigations.

The testing strategy consisted of excavating a series of non-contiguous 1 m X 1 m excavation units at each site. The initial test unit was placed either at an area that had a quantity of subsurface (from shovel testing) or surface artifacts, and/or at the crest of the particular topographic landform the site was situated upon. Based on the information recovered from the initial test unit concerning stratigraphy, deposit disturbances, and artifact content, combined with additional pre-subsurface testing information, the placement and number of additional test units were decided upon for each site.

Test units were excavated by square shovel and trowel and all soil was sifted through $\frac{1}{4}$ -inch wire mesh (Figure 7). Vertical controls were provided by utilizing 10-centimeter arbitrary levels within natural soil horizons, and cultural items from each provenience and level were bagged together.

One test unit at each site was excavated to 20 centimeters below



Figure 7. Test excavations at the B. Jones (23CE235) site.

apparent cultural deposits, in culturally sterile soil. This was determined by a combination of the absence of cultural material, and the recognition of natural soils (recognized by soil texture, color, and development).

In each test unit profiled, trowels were utilized to trim and smooth the walls prior to drawing the profile and photographing the wall. Not all test units were profiled at each site; rather, test units were selected that represented the range of variability in soil and/or cultural stratigraphy present at the site. At each site, one wall of the selected test unit was profiled for consistency. The same wall was profiled at each of the test units selected for profiling.

Soil horizons in each profile were defined by differences in grain size and content, color, apparent developmental levels (USDA 1975) (e.g. Ap=plowzone, B=B horizon), and moisture content/compaction. Munsell color charts were utilized to systematically and uniformly document soil color differences. More specific soils information for the three sites was gathered at the Cedar County Soil Conservation Service (Bill Savage personal communication).

Site maps for each site were produced by means of a hand-held Brunton compass, pacing, and a 50-meter tape. A temporary datum was set up off the site and north-south or east-west baselines were established and marked with surveyors' flags. Triangulation and

radiation-offset surveying techniques were then utilized to determine the placement of the test units, shovel tests, and specific point provenience information, while survey lines of different azimuths were employed to map the relevant topographic landforms in relationship to the site temporary datums.

Chapter VII

RESULTS

The site descriptions are designed to present those classes of information normally included in nominations to the National Register of Historic Places (e.g. T. King 1976; T. King et al. 1977:231-234). They include:

1. Location and contextual data with respect to local natural environmental and topographic features.
2. The nature of site investigations to date.
3. Site size and methods of determination.
4. Site internal composition, including features, stratigraphy, etc.
5. Temporal assessments and functional context.
6. The nature and extent of intrusions or disturbances.
7. Data limitations, if any.
8. A consideration of known, expected, or predicted data categories (see consideration of significance in Chapter VIII).

The Ronnie Pyle Site, 23CE252

The Ronnie Pyle site is situated on a small alluvial terrace at the base of a gentle ridge slope and at the edge of the Sac River floodplain (Figure 8), approximately 0.1 kilometer south of the present course of the Sac River. A small ditch parallels the west edge of the site, and a wooded ravine marks the southern edge of the site.

The alluvial terrace which slopes off in all directions, is about 6 to 10 feet above the floodplain of the Sac River, and is thus demarcated as a slight rise at the edge of the floodplain. Small swales and/or recent erosional ravines are present to the north and east (Figure 9).

Presently the site is in pasture, but is cultivated periodically. The soil deposits at the site are classified as the Sesetch Soil Series, a silt loam to a fine silty/sandy loam surface over a distinct B horizon clay. The A horizon ranges from 16 to 25 centimeters in depth, and the B horizon is an unknown depth below that.

The site area measures approximately 76 meters north-south, and 50 meters east-west, covering an area of ca. 3800 meters square or 0.9 acre (Figure 10). Cultural deposits are a maximum of 25 centimeters in depth, but are confined to the A horizon, which has been disturbed by plowing and is represented as an homogeneous soil deposit.

Site dimensions were determined through a series of systematically placed shovel test transects on north-south and east-west axes across the alluvial terrace. Of 30 shovel tests excavated in the site area, 12 shovel tests were positive; 11 of 14 shovel tests on the alluvial terrace itself were positive, and their distribution was employed to determine the maximum site limits. The remaining shovel tests were either in lower elevations adjacent to the floodplain or in higher elevations along the ridge slope to the east of the site.



Figure 8. The Ronnie Pyle site (23CE252).



Figure 9. The Ronnie Pyle site (23CE252), looking south.

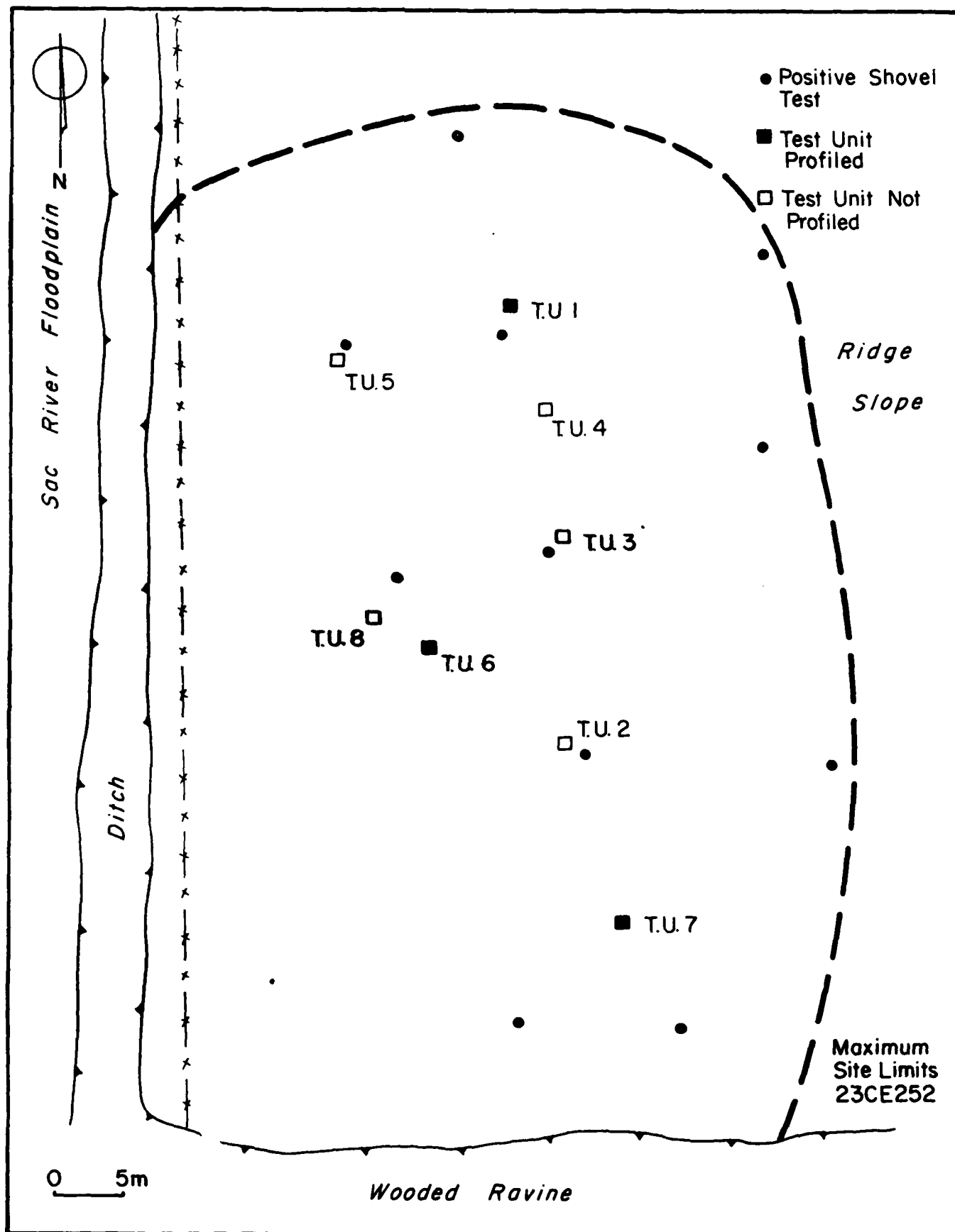


Figure 10. The Ronnie Pyle site (23CE252).

Soil profiles from three selected test units are presented below (Figures 11-13) to illustrate the variability in soil thickness, texture, and color across the site. The plowzone (Ap) is a dark brown (10YR4/3) silty loam from 16 to 25 centimeters in depth composing the modern plowzone. Below this are different facies of the underlying B-horizon clay. The clay ranges from yellowish-brown (10YR5/4) to a strong brown (7.5YR4/6) in color across the site; a 5-centimeter thick strong brown sandy clay was present in Test Units 6 and 8 between the Ap and the underlying clay B horizon. Cultural material was present only in the Ap horizon, and the underlying B horizon clays are sterile. No faunal or floral materials were present, and the soil color contrast between the A and B horizons is sufficiently great that if features were present they would have been observed.

Cultural Remains: Horizontal and Vertical Distribution

Appendix I provides an inventory of the prehistoric and historic cultural materials recovered during the Phase II investigations; the cultural material is listed by each provenience unit employed in the compilation of the data. Table 11 summarizes the artifact class frequencies from the Ronnie Pyle site general surface collection, shovel tests, and test excavations.

No intra-site variability in the presence or absence of features or middens could be ascertained. However, variability in the horizontal distribution of artifacts across the site is apparent, based on both the shovel testing and subsurface test excavations (Figures 14, 15). Two apparent subsurface concentrations of artifactual material, each located at an opposite end of the alluvial terrace, were recognized from the shovel test information. At the north end, densities above 5 artifacts/shovel test were noted, while densities above 3 artifacts/shovel test were noted at the south end. Cultural material is present between these two loci, and apparently is continuous between them (Figure 15).

This differential distributional pattern is amplified as well as modified by the results of the subsurface test excavations. There is considerable correspondence between the density of cultural material in subsurface excavations at the north end of the site and the information available from shovel testing. Densities of +500-900 artifacts/cubic meter in the plowzone are present over an area about 600 meters square at the northern end, and they drop evenly across the site. The southern artifact concentration noted in the shovel testing was not confirmed in the test excavations; nor were the lower densities between the two apparent concentrations. Instead, the lowest artifact densities on the site were recorded at the southern end of the alluvial terrace (Figure 14).

The horizontal distribution of artifactual material at the Ronnie Pyle site can be inferred to represent one main locus of cultural material centered at the northern end of the site, with lesser densities of cultural material to the east and south away from the Sac River floodplain. Based on the temporal assessment of the site (see below), it is likely that one or a limited series of occupations within one temporal horizon is responsible for the generation and deposition of the cultural material at the site.

The vertical distribution of artifactual material (Table 12), also supports the inference of one primary and homogenous period of deposition,

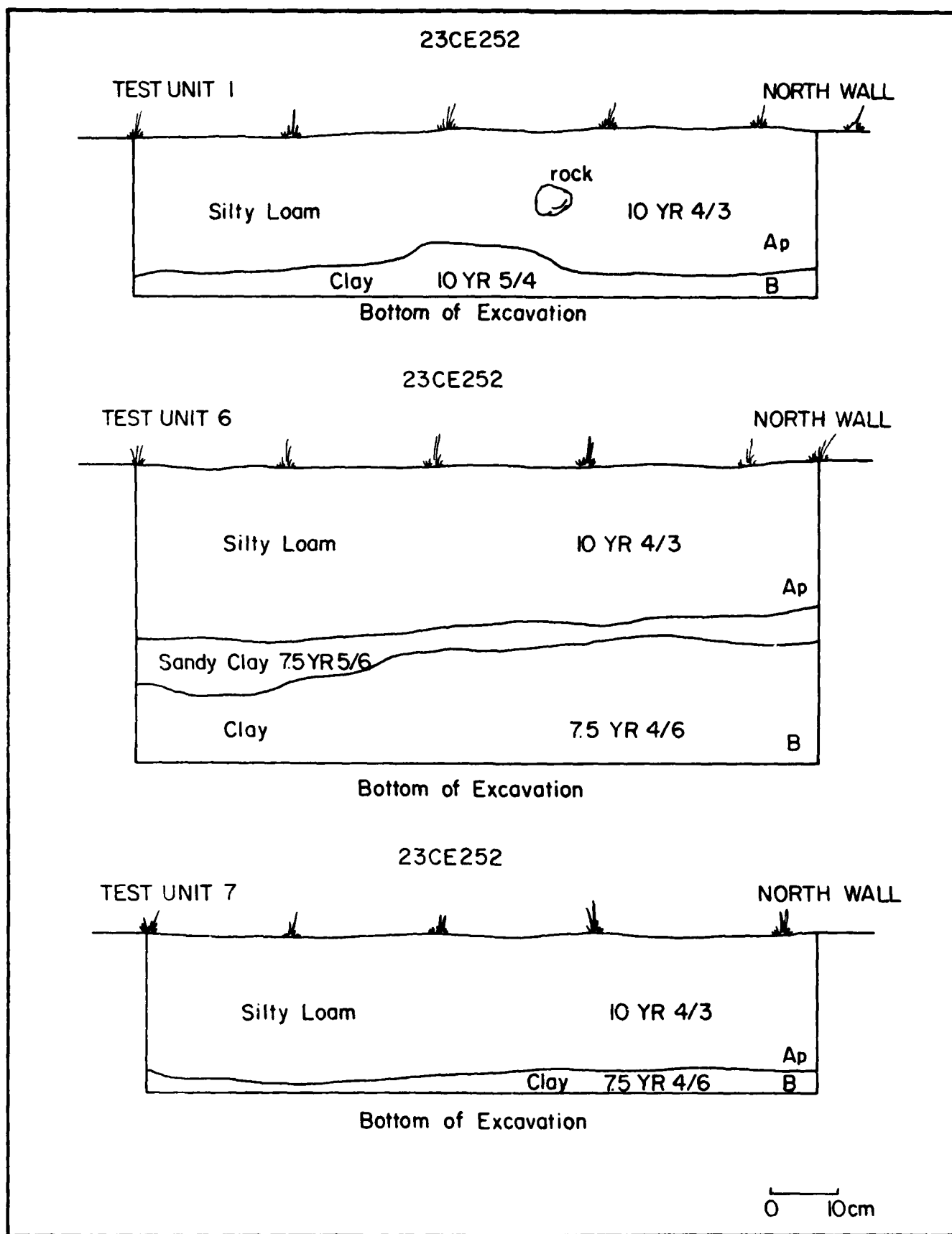


Figure 11 (Top). Profile of Test Unit 1, north wall, 23CE252.

Figure 12 (Center). Profile of Test Unit 6, north wall, 23CE252.

Figure 13 (Bottom). Profile of Test Unit 7, north wall, 23CE252.

Table 11

Artifact Class Frequencies, Surface Collections, Shovel Tests,
and Test Excavations, the Ronnie Pyle site (23CE252)

	Surface	Shovel Test	Test Excavations
primary element			11
secondary element	4	10	150
tertiary element	2	19	570
bifacial thinning element		1	6
core	4	4	7
thick biface	1		1
thin biface	2		
proj. pt/hafted cutting tool	2		1
arrowpoint			2
unifacial scraper			2
steeply retouched	1	1	12
spokeshave			1
split/tested cobble		1	10
pitted cobble			1
ground cobble			1
fire-cracked rock			12
Total	16	36*	787

*Two artifacts were recovered from a shovel test not depicted on Figure 15 since it is over 20 meters east of the apparent site limits.

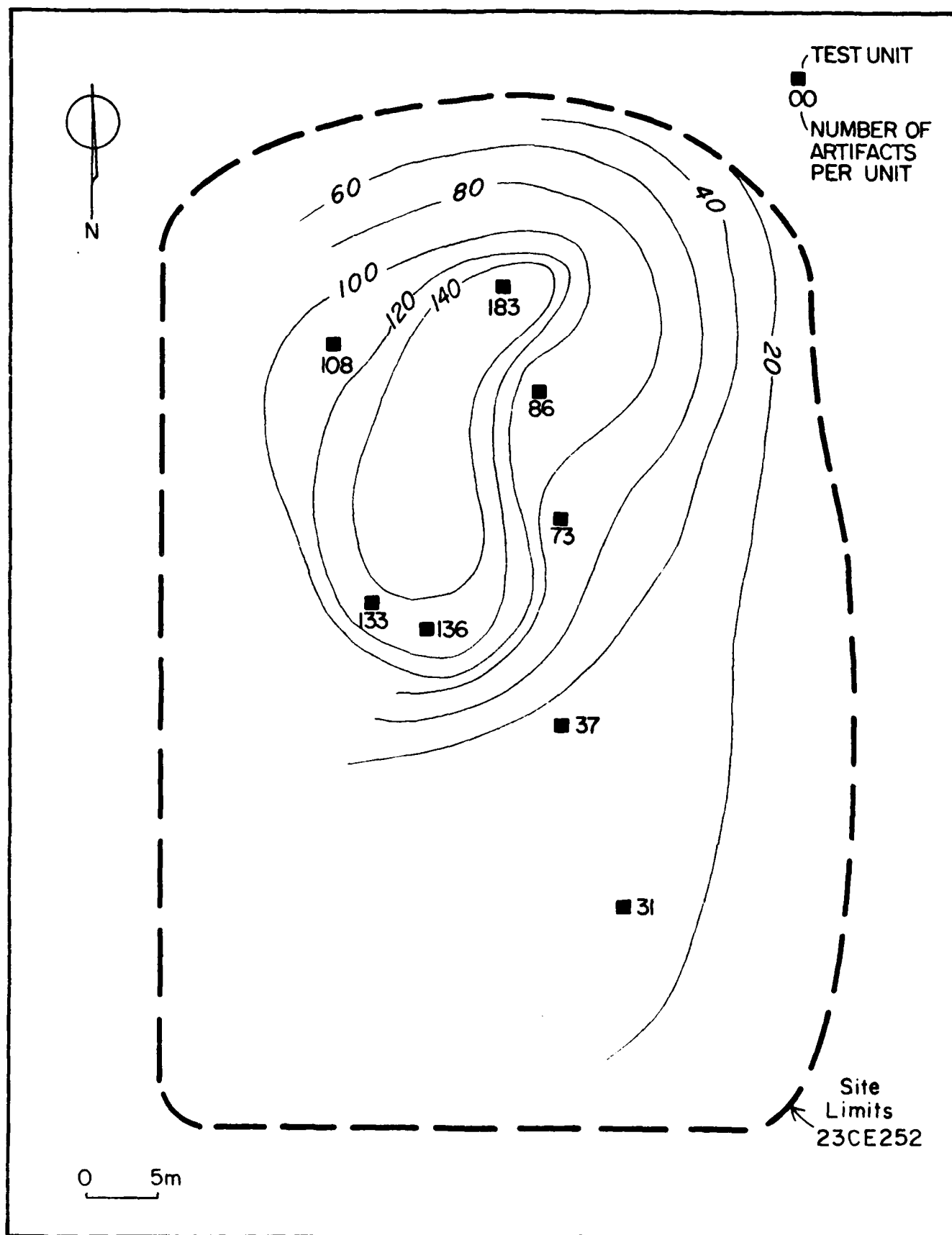


Figure 14. Horizontal distribution of cultural material based on sub-surface test excavations, the Ronnie Pyle site (23CE252).



Table 12

Artifact Class Frequencies by Vertical Level,
the Ronnie Pyle Site (23CE252)

	LEVEL 1 0-10cm	LEVEL 2 10-20cm	LEVEL 3 20-25cm
primary element	8	3	
secondary element	71	77	2
tertiary element	302	250	18
bifacial thinning	2	4	
core	3	4	
thick biface		1	
projectile point/hafted cutting tool		1	
arrowpoint	1	1	
unifacial scraper	1	1	
steeply retouched uniface	7	5	
spokeshave	1		
split/tested cobble	3	7	
pitted cobble		1	
ground cobble		1	
fire-cracked rock	7	5	
Totals	406	361	20
Number of levels	8	8	1
Cultural remains/ level (X)	50.8	45.1	20.0

probably as a surface scatter of artifacts that became incorporated into the developing plowzone. Densities within the plowzone are not significantly different; levels 1 and 2 mean range between 450 to 500 artifacts/cubic meter, while level 3 represents only the deepest portions of the A horizon at the site and derives from one test unit.

Cultural Remains: Artifact Assemblage

Most of the cultural material collected consists of lithic manufacturing and maintenance debris (92%), tested river cobbles, and cobbles reduced for the production of flakes. Bifacial tools, as well as bifaces characteristic of various hypothetical manufacturing stages, are rare at the site, and are outnumbered by flake tools.

The low frequency of primary elements (1.4% of the lithic debris) and of bifacial thinning elements (0.9%) in the lithic debris, and the correspondingly high representation of secondary and tertiary elements are indicative of secondary lithic reduction and tool maintenance at the site rather than a workshop situation. Some initial tool reduction did occur at the site, and river cobbles were collected and brought to the site, but the majority of primary reduction and core selection took place elsewhere (Figure 16).

The recovery of a Langtry projectile point/hafted cutting tool and a small expanding stem arrowpoint (Figures 17 and 18) suggests use of the site during Horizon 1 times (Kay 1978) or the Woodland period. Other projectile point fragments were recovered, and all were broken by fractures; descriptive information on the points is summarized in Table 13. The prevalence of transverse fractures on finished specimens of projectile points suggests that breakage is the result of use rather than manufacture (cf. Roper 1979c). Chomko (1976:100) concluded that Langtry points were used as hafted cutting tools because cutting and scraping use-wear evidence was present, and impact fractures were infrequent. The evidence from the Ronnie Pyle site, although quantitatively limited, is additional supporting data for this inference. However, the initial basis for this hypothesis derives from Ahler's study of Middle Archaic contracting stem (Hidden Valley type) points from Rodgers Shelter, Horizon 6, (Ahler 1971:Table 56) rather than Horizons 2 and 3 assemblages like Phillips Spring. The presence of impact fractures on Langtry points from Phillips Springs (Chomko 1976:32) also points to their use as projectile points.

The dominance of unifacial flake tools with acute edge angles suggests the importance of cutting, shredding, and scraping activities at the site for food processing and preparation (Figure 18). Projectile points/hafted cutting tools were also utilized in this fashion, as well as in hunting activities, as is attested by the small arrowpoints recovered from the site.

Ground stone tools were also present at the site, and were manufactured on coarse-grained sandstones likely derived from the Ordovician bedrock formations exposed in the river bluffs upstream from the site. Their likely function was also in food processing and preparation.

A wide variety of lithic raw materials was utilized in the manufacture and maintenance of stone tools at the Ronnie Pyle site. The consideration of raw material differences by tool types is complementary not only to the functional classifications employed as part of the Sac River lithic analysis, but also to the differential utilization of raw materials.



Figure 16. Cores from the Ronnie Pyle site.

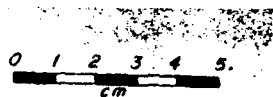


Figure 17. Projectile points (A-C) and bifaces (D-F) from the Ronnie Pyle site.

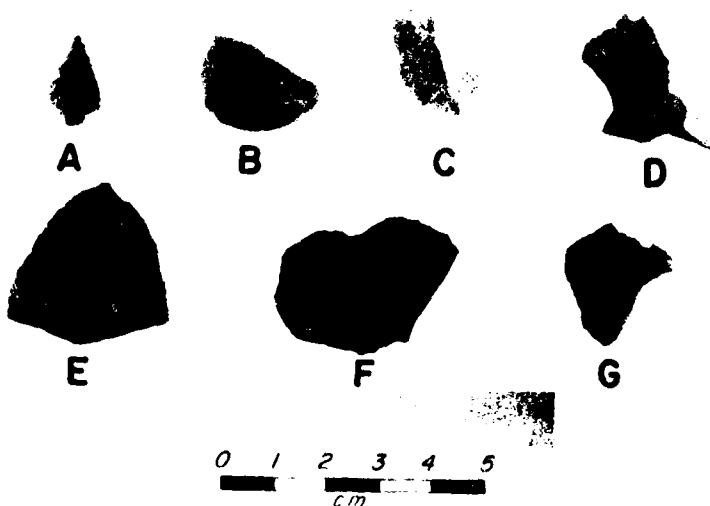
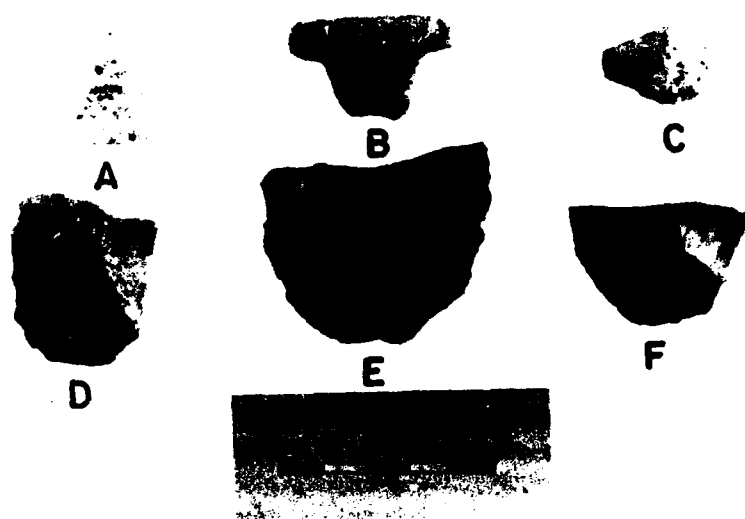


Figure 18. Arrowpoint (A) and unifacial tools (B-G) from the Ronnie Pyle site.

Table 13

Projectile Point Interval and Nominal Data, the Ronnie Pyle Site (23CE252)

Horizontal and Vertical provenience	maximum length (mm)	maximum width (mm)	maximum thick- ness (mm)	blade length (mm)	blade width (mm)	haft length (mm)	haft width (mm)	neck width (mm)	serration	heat treatment	resharpening/ beveling	raw material ¹	breakage pattern ²	Remarks	Figure
general surface collection	-	40	6	-	40	15	22	22	-	-	-	3	transverse	Langtry	17B
general surface collection	-	29	6	-	29	-	-	-	-	-	+	2	transverse	pp/hct midsection	17C
Test Unit 1 Level 1	-	-	-	-	-	-	12	-	-	+3	-	11	transverse	arrowpoint base	not illus- trated
Test Unit 6 Level 2	19	12	2	16	12	3	6	5	-	-	-	4	--	unifacial ex- 18A panding stem arrowpoint	
Test Unit 6 Level 2	-	23	6	-	23	-	-	-	-	-	+	2	transverse	blade pp/hct	17A

1 = see key to table 14 2 = after Ahler 1979 3 = present

First, the results can be fruitfully applied to further test the initial inferences about the functional variability in lithic assemblages (e.g. Greiser and Sheets 1979), and, secondly, to define the local availability of "suitable" raw materials. That is, while some raw materials appear to have been more suitable for particular tasks in a logical sense (e.g. fine-grained chert has a sharp edge for cutting), it is only within the context of predictable availability that formalized patterns of selection develop.

Assemblage data for site 23CE252 are summarized in Table 14. The numbered chert types are based on color differences, grain texture, and inclusions, and are presented in the key accompanying Table 14. Chert type 3, a banded gray-white chert deriving from the Ordovician Jefferson City Formation, is the predominant chert type for most artifact classes considered. Split river cobbles and rounded and weathered cortex remnants on cores and primary and secondary lithic debris suggest that the chert sources most commonly utilized were the gravel bars in the Sac River. Chert-bearing deposits in the uplands and bluffs to the east could also have been an additional source, but there is little evidence of their use at this site.

The most common raw materials are chert types 3, 1, 6, and 12, in that order. None of the chert types identified from the Sac River sites can be identified as non-local in the Sac River basin. The differences in the utilization of raw materials probably relate to three different but inter-related processes:

1. The kind of durability of the desired cutting edge (task-specific).
2. The differential distribution of chert types in localized chert gravel sources (site specific).
3. The types of reduction processes responsible for the lithic assemblage (manufacturing specific).

The edges produced on coarse-grained cherts are more durable than those produced on fine-grained cherts. Tools requiring a more durable edge as compared with a sharper edge would be associated consistently with more coarse-grained cherts and quartzites. Ground stone implements are uniformly manufactured on sandstones. A wider variety of chert types was employed in the manufacture of flake tools than in the production of bifacial tools.

The frequency of cores and primary elements are a good indication of the likely availability of raw materials around the Ronnie Pyle site, assuming a relatively localized site catchment area for the procurement of lithic material. The relationship between cores, primary elements, and total frequency of raw material types is clear (Table 14). Banded gray-white chert was the most available chert near to the site--near enough that pebbles and cobbles were carried to the site and subsequently reduced, producing at the site the complete manufacturing reduction sequence, and differences in flake size (e.g. Raab et al. 1979: Figure 2). A similar processual description would apply to white chert from the Burlington Formation. Some of the less frequently occurring chert types are probably not locally available, and represent less complete reduction sequences. A number of the chert types are represented only by debris and not by tools. The tool types either manufactured and/or maintained from these cherts were subsequently carried off the site and were not deposited there.

Table 14

Key: Lithic Types in Sac River Valley Sites

1 = white chert	Burlington Fm.
2 = mottled white chert	"
3 = banded gray-white chert	Jefferson City Fm.
4 = mottled gray-white chert	
5 = white-black chert	
6 = gray chert	
7 = translucent gray and white chert	
8 = mottled gray-brown chert	
9 = gray-black chert	
10 = banded blue-gray chert	Chouteau Fm? or Burlington Fm
11 = red chert	
12 = pink chert	
13 = red-pink chert	
14 = red-yellow chert	
15 = tan chert	
16 = tan-black chert	
17 = sandstone	
18 = quartzite	

Table 14

Lithic Raw Material Utilization, the Ronnie Pyle Site (23CE252)
Chert Types

Artifact Classes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	N
<u>Cores</u>	2		8			1		1			1				2				15
<u>Groundstone</u>																	2		2
<u>Flaked tools</u>																			
flake	2	2	11	2							1				2				20
bifacial	2	3	2																7
<u>Lithic debris</u>																			
primary	3	2	2								1	1						1	10
secondary	27	1	75	9	13	2			2	6	5	8	7	6				2	163
tertiary	47	34	219	19	51	3	1	2	3	10	49	25	14	13				2	592
bifacial thinning	2		4									1							7
N	185	42	321	30	0	65	5	2	2	5	19	56	33	21	23	0	2	5	816

The dominance of tertiary elements in certain chert types (i.e. types 6, 12-15) suggests they are products of tool maintenance and resharpening. Any local chert procurement at the Ronnie Pyle site presumably did not include these chert types, so another site or series of sites may well have a more complete reduction sequence present, or at least those phases of the manufacturing sequence necessary to produce tools on these materials.

Heat-treatment effects (e.g. Ray 1981) have not been systematically considered here because of the lack of experimental controls of chert types for the Sac River basin and because of the natural occurrence of various shades of red chert in local gravels. Color by itself will not adequately separate heated from unheated chert (Anderson 1979:223). Nevertheless, the combination of color change and a glossy, vitreous, and waxy surface is a probable indicator of heat-altered raw materials. Chert types 12 and 13 represent these characteristics in the lithic assemblage. In most cases it appears that chert type 1 was the material which had been heat-treated to produce types 12 and 13. It appears, therefore, that intentional heat treatment was applied at an advanced stage of reduction, when small cortical and non-cortical flakes were removed either from manufacture or later resharpening.

Summary

Site 23CE252 is a small (3800 m²) prehistoric archaeological site with a cultural deposit confined to the plowzone of an alluvial terrace. The artifact assemblage from the site consists primarily of tertiary lithic elements and a small series of flake tools, suggesting a relatively restricted range of activities conducted there. The horizontal and vertical characteristics of the site are indicative of one occupation, which, based on the projectile point data, was during the Woodland period or Horizon 1. All of the artifacts present seem to have been made on local cherts from river gravels, with white and banded gray-white chert most common.

The site is frequently plowed, but since erosion appears limited to the slopes of the terrace, the horizontal and vertical displacement of artifacts has not altered the distributional patterns of cultural materials across the site (see Figures 14 and 15). Hence, the nature of the site has not been greatly disturbed by periodic plowing. Shovel testing and test unit excavations have shown that site patterning and content are obtainable through further investigation of the site. All stages of local manufacturing/maintenance of stone tools are present at the site, so data on lithic technology and the utilization of particular lithic raw materials are also present and potentially abundant.

The B. Jones Site, 23CE235

The B. Jones site was located originally during the 1976 cultural resources survey conducted by the University of Missouri-Columbia (Roper 1977). It is situated in the floodplain of the Sac River on a natural levee from 15 to 50 meters away from the present bank of Sac River.

In this area of the Sac River floodplain the topography is characterized by a distinctive swale and ridge system (Figure 19) associated with old channels of the Sac River (Figure 20). The U.S. Army Corps of Engineers and Soil Conservation Service aerial photographs quite distinctly show the



Figure 19. The B. Jones site and local environs.

old channel and meander loops against, then away from, the base of Helt Bluff. The swale and ridge system is partially oriented with respect to the old Sac River channel and partially oriented with respect to the modern channel of Sac River.

The natural levee that 23CE235 is situated upon follows a sinuous course parallel to the old channel; the adjacent ridges to the east and west are intermediate in position. The fact that these ridge knolls presently are being eroded does suggest that they were formed by a channel in a different position, and the changing meanders of the Sac River are oriented to them differently now than previously. The old meander loop mapped on Figure 20 is likely only one of many previous channel meanders in this broad alluvial bottomland; other Soil Conservation Service aerial photographs suggest that an old channel ran between 23CE235 and the ridge knoll to the west. The relationship of all the known sites in the Jones bottoms in the floodplain of Sac River points to a clear association between site locations and the old meanders and channel of the Sac River rather than to the modern Sac River. The implications of this pattern are discussed in more detail below when Roper's (1977) settlement pattern model for the Sac River floodplain is evaluated.

The natural levee is from 5 to 10 feet above the floodplain of Sac River and has relatively steep slopes along both the north and west sides. The site is presently in cultivation. The soil deposits at the site are now classified in the Newtonia soil series (Bill Savage

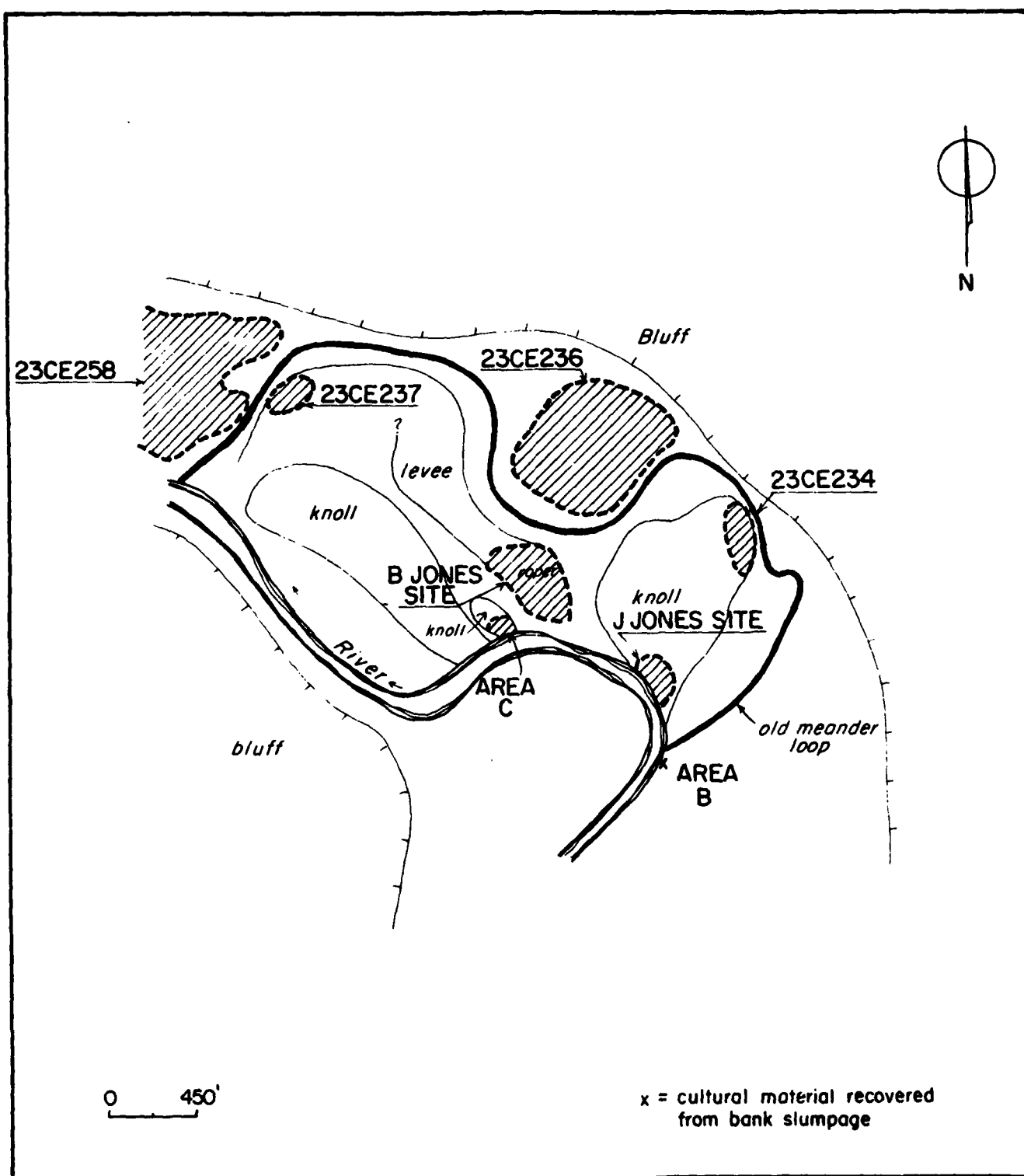


Figure 20. Location of the J. Jones (23CE324) and B. Jones (23CE235) sites in relationship to all other known sites in the vicinity, and topographic features in the floodplain of Sac River (after COE aerial photograph and Roper 1977).

personal communication); the series occurs on ridges and levees that flood rarely, probably once every 100 years, and consists of a dark brown silty loam surface or A horizon, with silt loam facies to at least 7 feet in depth. The dark brown soil color is related not to the amount of organic material deposited by flooding but to the probable association of bottom-land tallgrass prairie with this soil series and the subsequent enrichment of the soil. The upper deposits at the site are moist, but become more compact and light in color below 20 centimeters. Rocks do not occur naturally in this alluvial soil.

Because the site area did not have a uniform surface cover it was not possible to fully determine site size, but it is likely that cultural material on the northern end of the levee has a similar distribution to that observed on the southern end. The known site area measures approximately 90 meters north-south and 150 meters east-west, an area covering 13,500 meters square or 3.3 acres (Figure 21). Site dimensions were established through the surface examination of the distribution of artifactual material.

Soil profiles from Test Units 2 and 4 at 23CE235 (Figures 22, 23) illustrate the limited variability in soil character at the site. The plowzone is a moist dark brown (10YR3/3) silty loam approximately 20 centimeters in thickness. Below that is a more compact and drier dark brown to dark yellowish brown (10YR3/4 to 10YR4/4) silty loam of the A horizon. Cultural material does occur in both soil units, but the density of the cultural material decreases below 20 centimeters. Cultural material from the general surface collections and the 4 1 m X 1 m test units is summarized in Table 15. Appendix I provides more specific inventories of the cultural material by the various provenience units employed in the analysis.

Artifacts occur in low frequencies in the excavated test units, with 180 artifacts/cubic meter the densest concentration of material from the A horizon in Test Unit 3. The test units located toward the eastern end of the surface scatter at 23CE235 had 1 and 5 artifacts per test unit, a very low frequency of material. No middens or other cultural features were observed from subsurface or surface examinations of the B. Jones site.

Since the general surface collection was not systematically collected it is possible that any differences in the artifact assemblage between surface and excavated data are directly the result of collection bias. To evaluate this, a chi-square analysis was performed to determine whether the artifact class frequencies are not significantly different between surface and subsurface contexts. The artifact class frequencies are as follows:

	Surface	Subsurface
lithic debris	324 (82%)	83 (87%)
bifacial tools	12 (3%)	3 (3%)
flake tools	39 (3%)	5 (5%)
fire-cracked rock	19 (5%)	4 (4%)

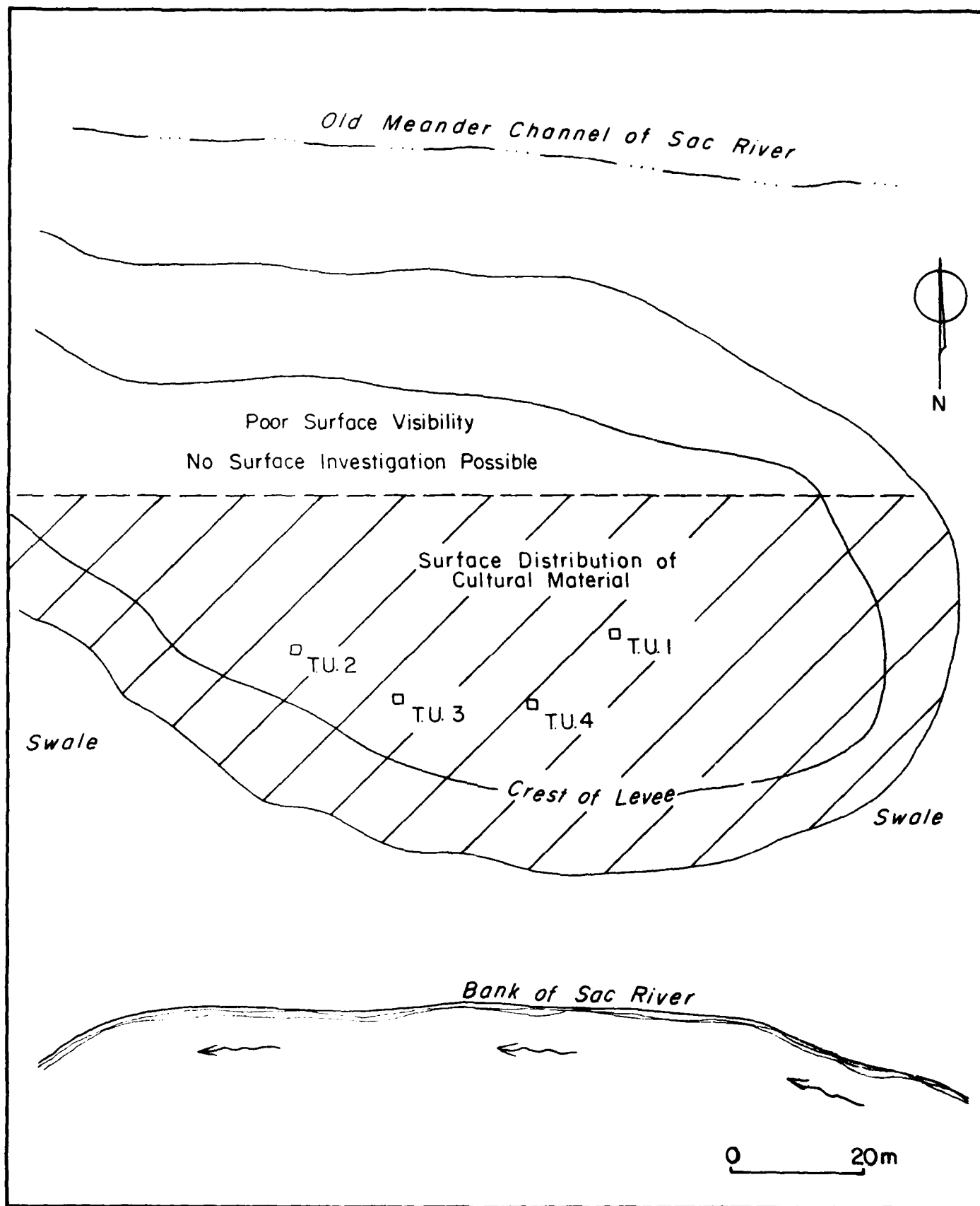


Figure 21. The B. Jones site (23CE235).

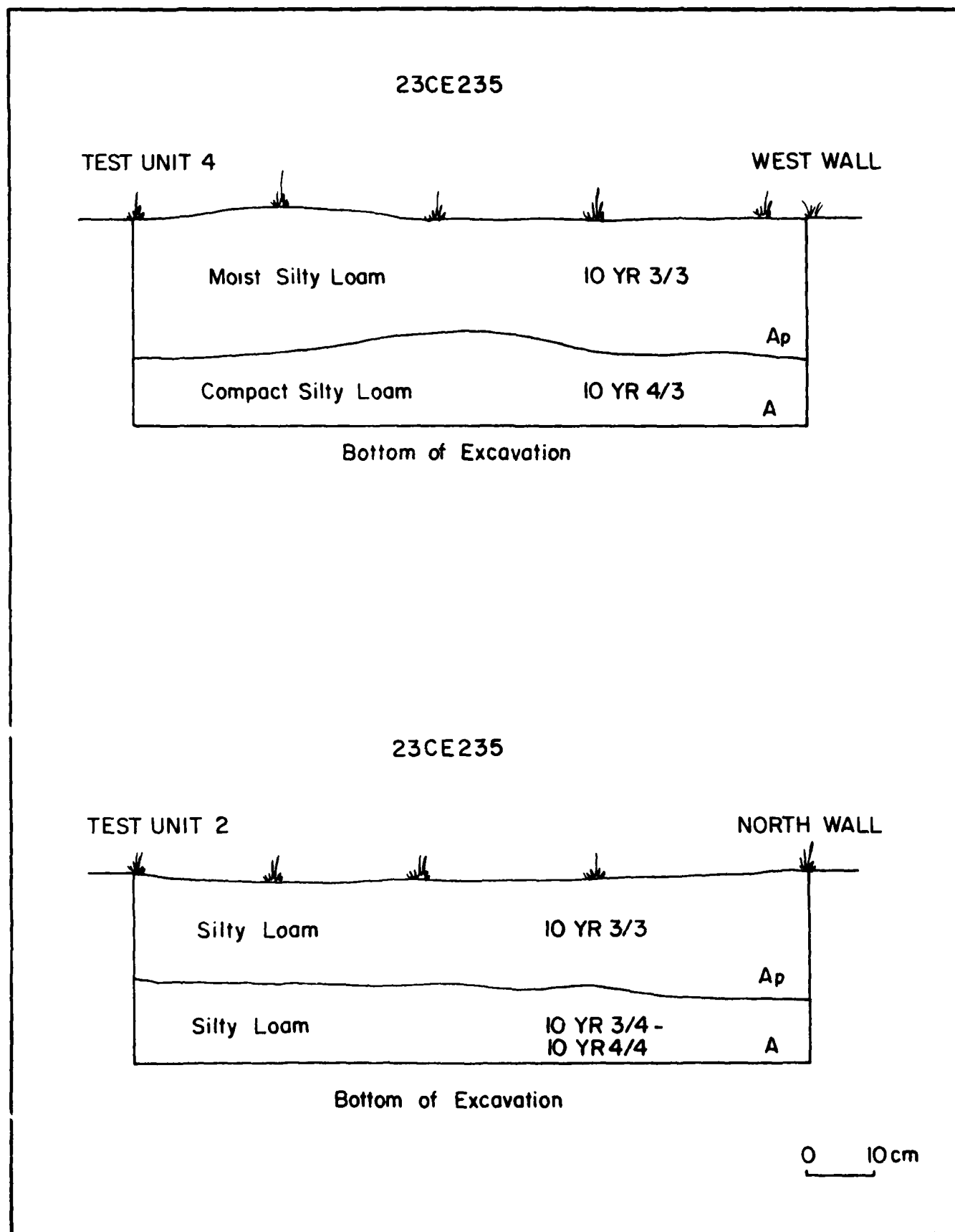


Figure 22 (top). Profile of Test Unit 4, west wall, 23CE235.

Figure 23 (bottom). Profile of Test Unit 2, north wall, 23CE235.

Table 15

Artifact Class Frequencies, Surface Collections, and
Test Excavations, the B. Jones Site (23CE235)

	Surface	Test Excavation
primary element	9	
secondary element	113	13
tertiary element	201	69
bifacial thinning element	1	
core	26	
thick biface	4	1
thin biface	3	1
projectile point/hafted cutting tool	5	1
arrow point	2	
unifacial scraper	7	1
steeply retouched uniface	26	5
spokeshave	1	
graver	1	
perforator/drill	2	
pitted cobble	4	
fire-cracked rock	19	4
Total	424	95

The observed value of chi-square is $X^2=2.30$, far lower than the X^2 at the 0.05 probability level for three degrees of freedom. From this, it is possible to conclude that the artifact class frequencies between the two contexts are not significantly different and represent samples from the same population. Thus, even though the general surface collection was not obtained in a systematic fashion, it is representative of the subsurface population present at the site and significant biases are not recognized.

The majority of the surface material collected was concentrated on the levee slopes rather than the levee crest, so it was not possible to predict the horizontal distribution of artifacts across the site prior to the test excavations. Some differential densities are apparent, but this is based on only four test units. Since the subsurface and surface artifact class frequencies are derived from the same population, it is possible to assume that the placement of the test units adequately sampled the subsurface population though on a smaller scale than the surface collections.

Densities of subsurface cultural material at 23CE235 are concentrated in level 2 of the deposit, the lower half of the modern plowzone, with both level 1 and 3 densities significantly lower. The density of material is from 7 to 15 times lower than 23CE252 and 4 times higher than 23CE324, and averages 80 artifacts/cubic meter of deposit (Table 16).

Cultural Remains: Artifact Assemblage

While manufacturing and refurbishing/resharpening lithic debris is most frequent in the artifact assemblage, lithic tools of variable forms and functions are also present.

The high frequency of cores, primary elements, and secondary elements in the artifact assemblage indicates that a primary focus of the occupation at the site was the initial procurement, testing, and reduction of lithic raw materials into tools. Banded gray-white Ordovician cherts were most commonly selected for manufacture, but at least 7 different chert types were probably gathered from Sac River gravels. Extensive chert gravel bars are present on the outside of the modern Sac River channel opposite the site, though it is unlikely that such was the case when the site was initially occupied since the channel ran on the other side of the site. In any event, local river gravels were the source of the raw materials (Figure 24).

Both small arrowpoints and projectile points/hafted cutting tools were recovered from the general surface collection and the test excavations (Table 17). A small preform resembling a Crisp Ovate (Chapman 1980:307) and an arrow point blade midsection were identified, as were 3 Langtry points, 1 corner-notched projectile point/hafted cutting tool, and the base of a straight stemmed PP/HCT (Figure 25). The corner-notched PP/HCT had fractured from stress caused by its use (see Roper 1979c); the blade had been extensively reworked before it broke. The incurvate blade shape and the small step-flaking (Ahler 1971:39) on the edge of the Langtry blades are indicative of blade utilization and resharpening.

A Horizon 1 occupation is suggested by the predominance of Langtry PP/HCTs and small projectile points. Small corner-notched dart points are common in Horizon 1-3 at Rodgers Shelter, and straight-stemmed



Figure 24. Core tools from the B. Jones site.

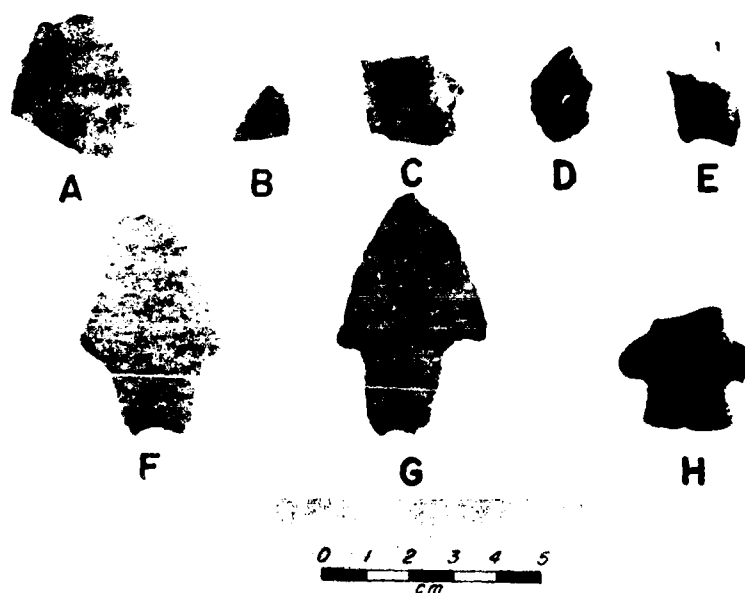


Figure 25. Projectile points from the B. Jones site.

Table 16

Artifact Class Frequencies by Vertical Level,
the B. Jones Site (23CE235)

	0-10cm LEVEL 1	10-20cm LEVEL 2	20-30cm LEVEL 3
secondary element	3	5	5
tertiary element	16	40	13
thick biface		1	
thin biface	1		
projectile point/ hafted cutting tool	1		
unifacial scraper			1
steeply retouched uniface	2	3	
fire-cracked rock	2	2	
Total	25	51	19
number of levels	4	4	4
cultural remains/ level (X)	6.2	12.8	4.8

PP/HCTs have a similar distribution. It is possible to attribute the occupation at 23CE235 to one Horizon (Woodland) with the possibility of a maximum of occupations within three Horizons (Late Archaic to Woodland).

Roper (1977:102-103) identified the component at 23CE235 as Middle Archaic based on the recovery of a Big Sandy notched PP/HCT. A re-examination of this point (Roper 1977:Plate 1) suggests that the point is misidentified; it does not fit the formal description of Missouri PP/HCT which Chapman (1975:242) has classified as Big Sandy. It more closely resembles points in a general medium-to-large corner-notched category which is attributed to the Late Archaic/Woodland period in Southwest Missouri (Helm and Purrington 1980:32). In any event, the other types identified from 1981 investigations lead us to conclude that the major occupation substantially postdates the Middle Archaic.

Flake tools outnumber bifacial tools, and ground stone tools are also present at the site (Figures 26-29). If the archaeological material present at 23CE235 can be accounted for as the product of one occupation, a fairly wide range of tool types and activity sets is present. However, the low density of the artifactual material suggests a limited number of occupations of the site through time, with broken

Table 17

Projectile Point Interval and Nominal Data, the B. Jones Site (23CE235)

Horizontal and Vertical provenience	maximum length (mm)	maximum width (mm)	maximum thickness (mm)	blade length (mm)	blade width (mm)	haft length (mm)	haft width (mm)	neck width (mm)	serration	heat treatment	resharpening/ beveling	raw material ¹	breakage pattern ²	remarks	figure
general surface collection	21	15	5	-	-	-	-	-	-	+3	-	3	irregular	crisp ovate	25
general surface collection	-	13	2	-	13	-	-	-	-	-	-	6	transverse	unifacial arrowpoint blade	
general surface collection	-	-	9	-	-	20	24	24	-	-	-	3	transverse	straight stemmed pp/hct	
general surface collection	-	31	7	-	31	-	-	-	-	+	+	3	transverse irregular	blade mid- section	
general surface collection	-	-	-	-	-	16	16	16	-	-	-	6	transverse irregular	contracting stem pp/hct concave base	
general surface collection	-	34	7	-	34	16	22	22	-	-	+	6	transverse	Langtry	

Table 17 (continued)

Horizontal and Vertical provenience	Maximum length (mm)	Maximum width (mm)	Maximum thick- ness (mm)	blade length (mm)	blade width (mm)	haft length (mm)	haft width (mm)	neck width (mm)	serration	heat treatment	resharpening/ beveling	raw material ¹	breakage pattern ²	remarks	figure
General surface collection	-	32	7	-	32	11	21	19	-	-	+	3	transverse	corner-notched pp/bct	
Test Unit 2 Level 1	57	35	7	37	35	20	18	18	-	-	+	1	--	Langtry	

1 - see key to table 14

2 - after Ahler 1979

3 - present

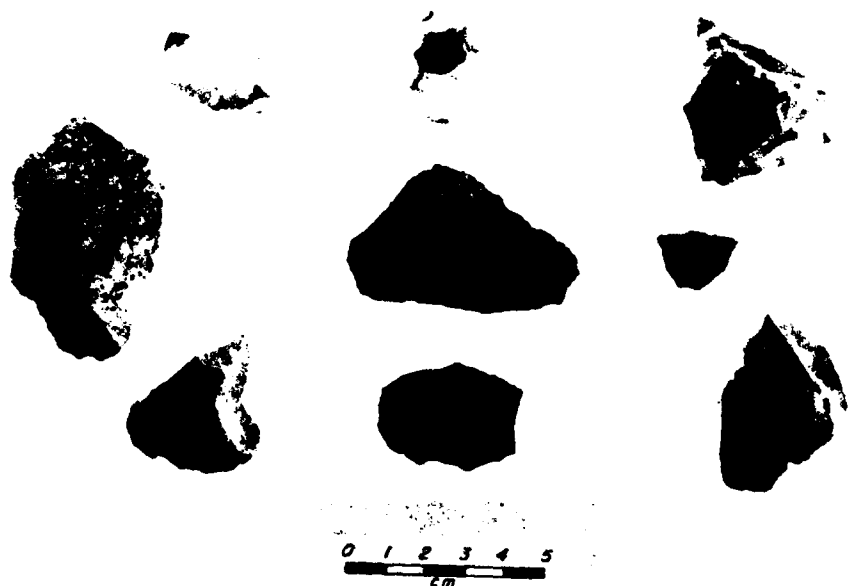


Figure 26. Unifacial tools from the B. Jones site.

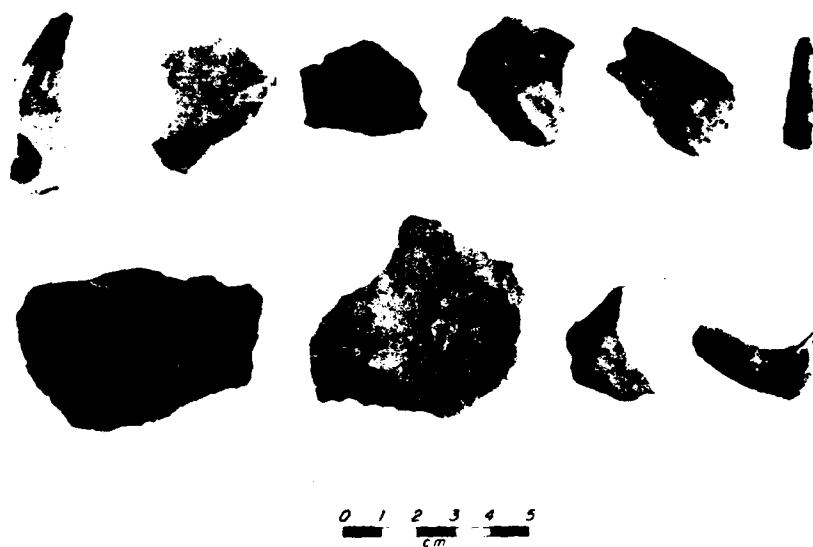


Figure 27. Unifacial tools and drill tip from the B. Jones site.

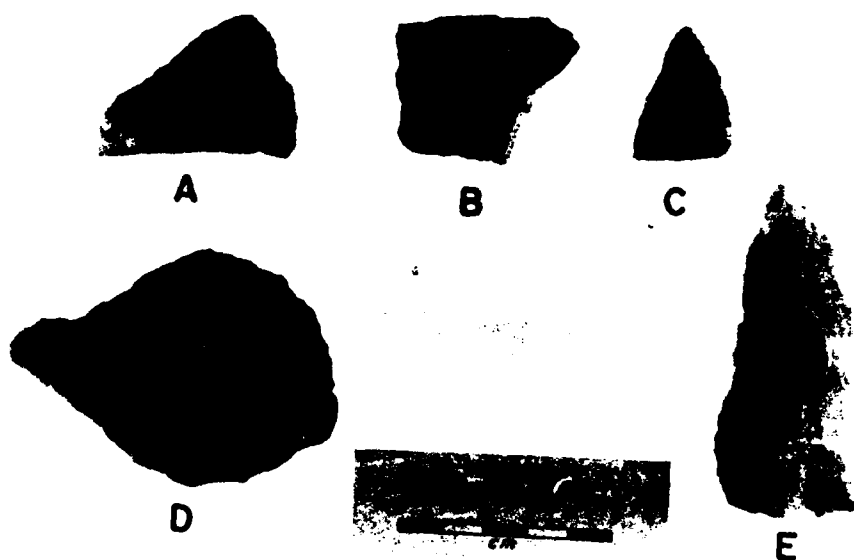


Figure 28. Bifaces from the B. Jones site (A-D) and Area B (E; see Figure 20).

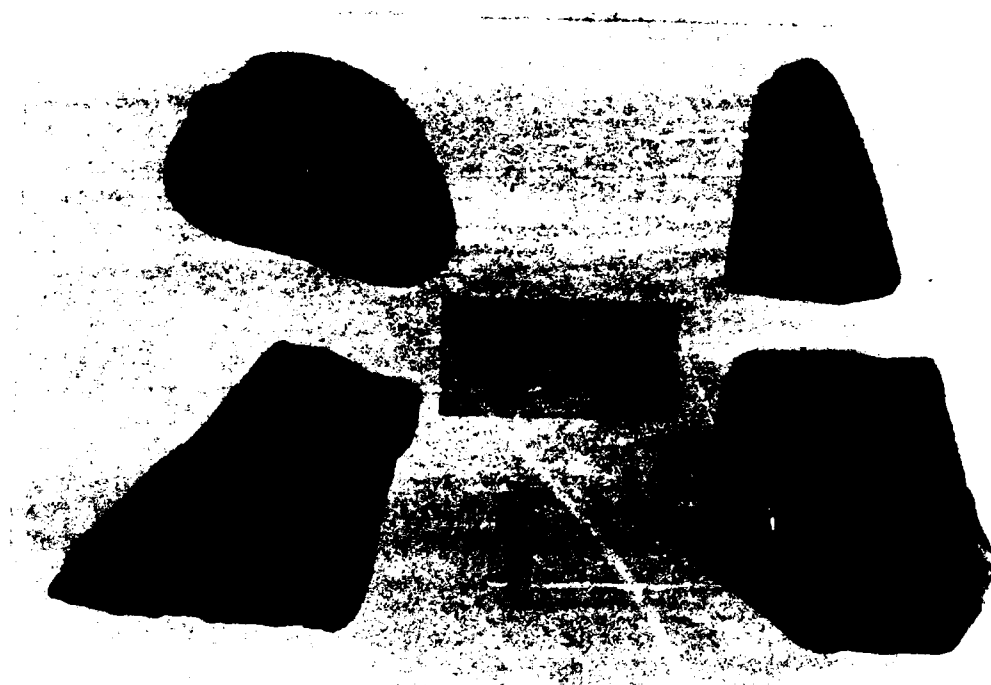


Figure 29. Ground stone tools from the B. Jones site.

tools and non-curved items (cf. Schiffer 1976) discarded or lost at the site with each reoccupation. The limited quantity of fire-cracked rock in the artifact assemblage would be characteristic more of plant and meat food procurement, some processing, but little cooking at this locus. In most characteristics this site resembles a "seasonal" site designed for floodplain resource procurement (including lithic raw material procurement) that would have articulated with more permanently occupied base camps or villages such as Flycatcher and Dryocopus in the Woodland settlement system.

White chert (Burlington Formation), banded gray-white cherts (Jefferson City Formation), and gray cherts account for approximately 75 percent of the lithic material utilized and discarded at the site. Chert types 5 and 7 are represented solely by tool forms, implying that these tools were carried to the site from other residential bases where they were produced; they were not produced at the site. Gray-white banded cherts were most often selected for cores (or else initially tested but never completely bifacially reduced) and the production of bifacial tools, while white and gray chert types were more frequently selected for the manufacture of flake tools (Table 18). The functional parameters of this variability in raw material utilization have been previously discussed.

The utilization of thermal alteration at 23CE235 is not comparable to 23CE252. The examination of artifact class frequencies for chert types 12 and 13 at 23CE235 suggests that heat treating was employed not only at the final stages of tool production but also at the initial production stages. Cores and primary lithic elements evidence heat treatment. In this instance, thermal alteration was probably designed to improve the quality of the particular raw material (e.g. Anderson 1979:229). This process was not frequent at the B. Jones site.

Summary

Site 23CE235 is a large (13,500 m²) prehistoric archaeological site located on a natural levee of the Sac River, probably associated with an old Sac River channel. The site is cleared and presently in cultivation. Test excavations indicated that cultural material is present in low densities and confined primarily to the plowzone. There appears to have been a low density scatter of cultural material across the entire levee area, though now it is concentrated on the levee slopes. Systematic surface collections were not possible because of the erosion factors.

The statistical examination of the general surface collections and test excavations indicated that both are part of the same population or artifact assemblage. Based on the limited testing of 23CE235, subsurface features are absent; no surface indications of features (such as organic soil staining or concentrations of cultural material) were noted in the site area.

Langtry points/hafted cutting tools and arrowpoints were recovered, suggesting at least a Horizon 1 (Woodland) occupation. No convincing evidence of any kind was recovered to substantiate Roper's (1977) suggestion that the site was occupied during the Middle Archaic. Furthermore, while a substantial variety of different tool forms were recovered from the site, the absence of fire-cracked rock and the general low density of cultural material and tools are more characteristic of a periodically reoccupied, limited activity location (e.g. Binford 1980) than of a base camp per se.

Table 18

Lithic Raw Material Utilization, the B. Jones Site (23CE235)

Artifact Classes	Chert Types																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	N
<u>Cores</u>	4	1	13		3	3		1					3		1				25
<u>Groundstone</u>																	4		4
<u>Flaked Tools</u>																			
flake	17	1	10		1	7	3		1						2				42
bifacial	3		7			2		1	1									1	15
<u>Lithic debris</u>																			
primary	3		3								1		2						9
secondary	29	3	44			7			1	4	3	4	21		5			2	123
tertiary	106	12	81	11		33			9		3	14			2				271
biface-thinning	1																		1
N	163	17	158	11	1	52	3	1	13	4	7	18	26	0	9	1	4	3	491

White and banded gray-white locally available cherts were utilized in the manufacture of stone tools at the site. The initial procurement and processing of Sac River gravels were primary activities at 23CE235.

The site is plowed frequently, and this activity hindered the collection of data on intra-site patterning and the differential utilization of the site area. Two of the 4 test units excavated had very limited artifactual material, but the materials recovered from subsurface excavations were complementary to the general surface collection data in artifact content. Data on lithic technology and the utilization of particular lithic raw materials should be obtainable through further investigation of the site.

The James Jones Site, 23CE324

Site 23CE324 is located on the right (downstream) bank of the Sac River in the approximate inside center of a modern Sac River meander loop (Figures 2, 20, 30). The water mark in the bank of Sac River that represents the water level at maximum power release is clearly visible. Bank slumpage is caused by the combination of bank undercutting and high soil saturation from flooding induced by power generation.

The cutbank on the inside meander loop of the Sac River was thoroughly examined across the entirety of the river bank illustrated in Figure 30. The walls were almost vertical, with a small talus of bank slumpage at the water's edge, and from 3 to 5 meters in height. No cultural material was recovered from the cutbank below 23CE324, but a small number of artifacts was recovered at the water's edge about 80 meters south of 23CE324. This area has been labeled as provenience area B (Figure 20), and the three artifacts recovered are listed in Appendix I. Thus, while impending bank slumpage is probable at site 23CE324, bank erosion at present has not exposed the cultural deposits at the site. However, over a 5-year period at the Montgomery site (23CE261), over 93 feet of horizontal erosion was recorded (Collins et al. 1977:5). A similar pattern of erosion would totally remove 23CE324, if the estimated site limits are accurate.

The James Jones site is situated on a low knoll which is probably a natural levee remnant about 50 to 100 meters east of 23CE235; a deep swale (old channel?) separates the two sites (Figure 20). The knoll covers an approximate 4-acre area, but the "concentration" of cultural material is confined to the southwest quadrant of the knoll. The site area measures 30 meters north-south by 70 meters east-west, 2100 m², or 0.5 acre (Figure 31).

The site area is presently in cultivation (Figure 32). The soil deposits at the site are comparable to 23CE235 (Bill Savage personal communication): Newtonia soil series, a dark brown silty loam of considerable depth and soil development.

The boundaries of the site were defined by the systematic surface collection of 5 1-meter-wide transects. Those areas of the transects shown on Figure 31 as extending past the estimated site limits are those 1 m X 10 m collection units (see Chapter 6) which had no cultural materials. Five 1 m X 1 m test units were then excavated within the probable site area or immediately adjacent to it. Test units were placed randomly across the site area to sample potentially different soil deposits and/or intra-site differences in artifact content.



Figure 30. Cutbank on Sac River at J. Jones site.

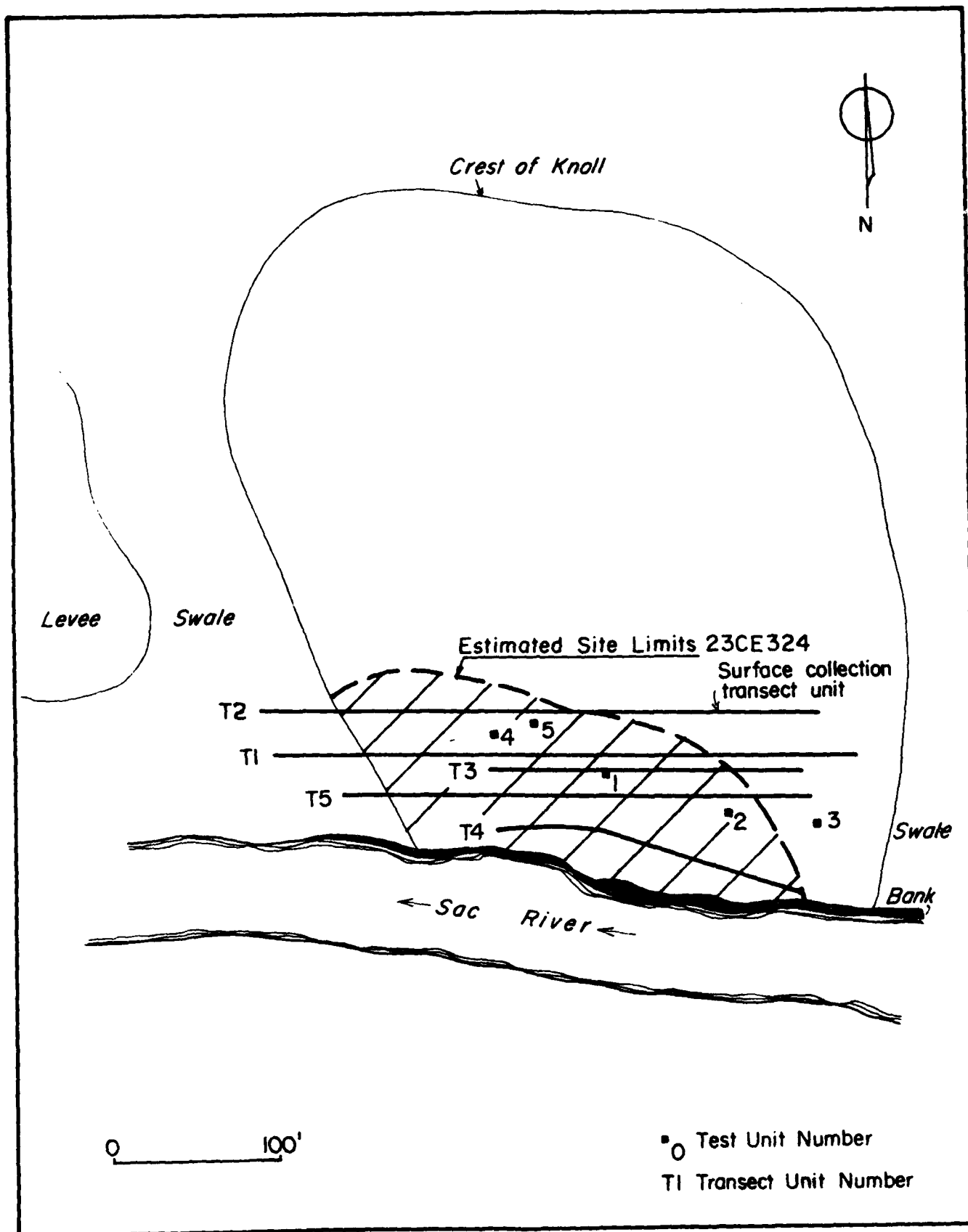


Figure 31. Surface collection units, excavation units, and site limits, J. Jones site (23CE324).



Figure 32. The J, Jones site area.

Selected test unit profiles are presented in Figures 33 and 34. A dark brown silty loam plowzone of about 15 to 20 centimeters thickness overlay a more compact and less moist silty clay of dark brown color (10YR3/3) that is transitional to a dark yellowish brown silty clay exposed at 35 centimeters below the surface. The soil profile represents a natural soil deposit; no cultural disturbances were identified in the soil deposits examined at this site.

Cultural Remains: Horizontal and Vertical Patterns

The limited number of artifacts recovered from the test units place little confidence in the validity of any observed patterns of artifact distributions across the site. Based on the surface collection transect units (Appendix I), surface cultural material is more abundant about 10 to 20 meters away from the present river bank of the Sac River, and lesser amounts of cultural material occur at the northern and southern edges of the site. Table 19 provides more specific information concerning artifact class representation at 23CE324.

Subsurface evidence is so meager that it is more appropriate to regard 23CE324 as a surface scatter that through plowing has become partially incorporated into the disturbed plowzone (Table 20). Densities of cultural material range from 7 to 24 artifacts/cubic meter of deposit. No features or midden staining were noted either on the surface or in the subsurface soils.

Given that the surface collection transect units cover a representative portion of 23CE324, it is possible to estimate the total frequency of surface artifacts present at the site. The total site area covered by the 5 transect units is 285 meters square, and 34 artifacts were recovered. Therefore, the sample mean and standard deviation for artifact frequency by area is one artifact per $8.4 \pm 3.6 \text{ m}^2$ of the site. If this applies to the entire site area, a mean of 250 artifacts and an estimated range of 175 to 438 artifacts were present on the surface of the site. While artifacts exposed on the surface represent only a small sample of the total number of artifacts present on a site (e.g. Lewarch and O'Brien 1981)—in this case, approximately 5 percent based on the density of material in the plowzone—it is clear from this examination of artifact densities that 23CE324 can be very adequately described as a low density scatter. The entire estimated artifact population of the site is +5000 artifacts; the sample considered here constituted about 1.44 percent of the site artifact population.

Since so few artifacts could be expected to be present on the site's surface at any one time, it would be very easy to overlook the site in a cursory examination, while at the same time the complete and systematic collection of surface artifacts would almost be a necessity to delimit adequately quantitative and qualitative differences on an intra-site level. The surface collection conducted here does not claim to be comprehensive in such a manner; at best, only general quantitative differences within the site area could be specified. The small size of the site, and the limited number of artifacts present, would seem to suggest a relatively short-term occupation or set of reoccupations on this floodplain knoll.

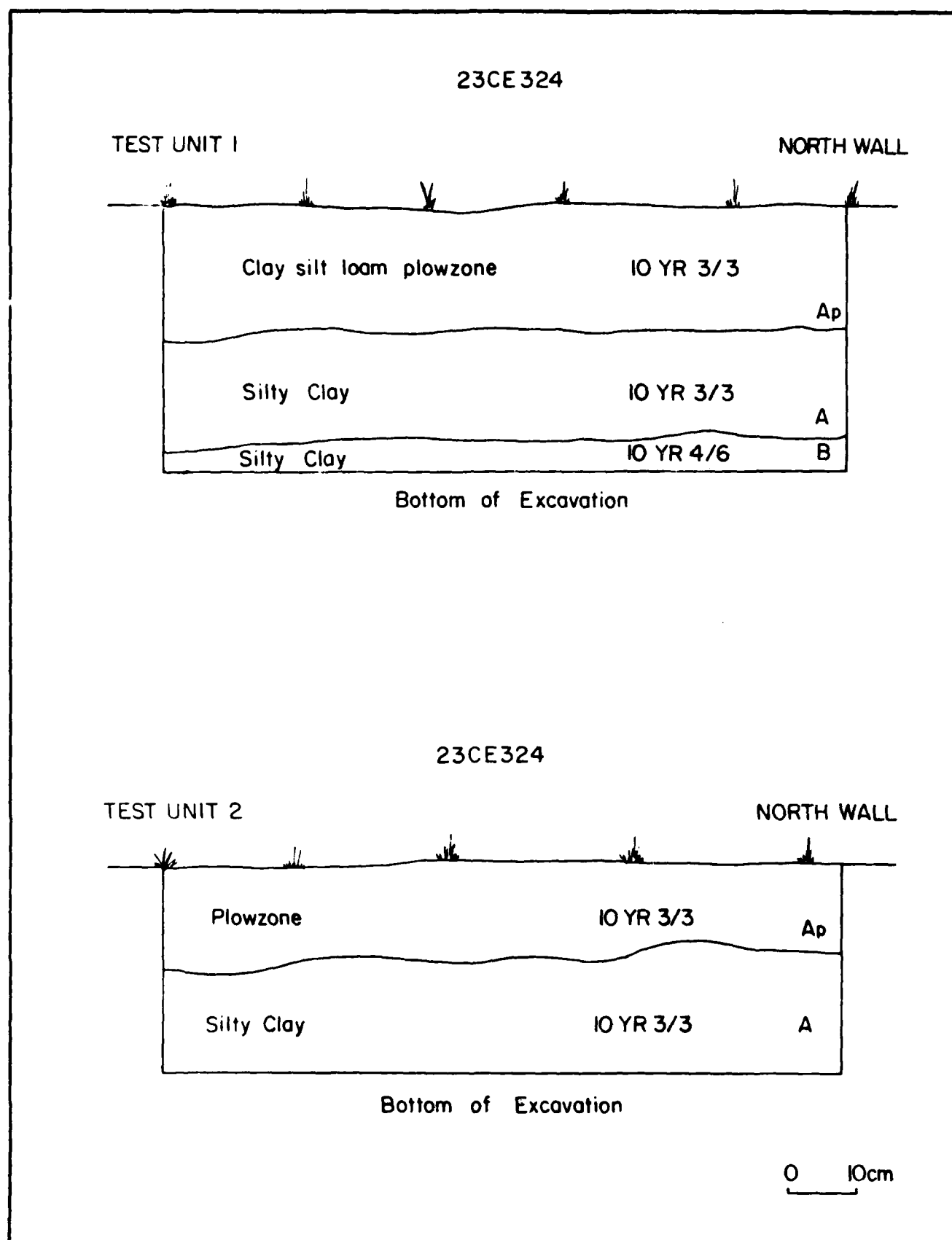


Figure 33 (top). Profile of Test Unit 1, 23CE324, north wall.

Figure 34 (bottom). Profile of Test Unit 2, 23CE324, north wall.

Table 19

Artifact Class Frequencies, Surface Collections and
Test excavations, the J. Jones Site (23CE324)

	General Surface	Transect Surface	Test Excavations
secondary element	3	4	4
tertiary element	8	18	15
bifacial thinning element	1		
core	3	1	2
projectile point hafted cutting tool	4	1	
arrowpoint		1	
unifacial scraper	1		
steeply retouched uniface		2	1
pitted cobble		1	
mortar	1		
firecracked rock	4	6	3
Total	25	34	25

Table 20

Artifact Class Frequencies by Vertical Level
the J. Jones Site (23CE324)

	0-10cm LEVEL 1	10-20cm LEVEL 2	20-30cm LEVEL 3	30-40cm LEVEL 4
secondary element	2	1	1	
tertiary element	5	7	1	2
core	1	1		
steeply retouched uniface	1			
fire-cracked rock	3			
TOTALS	12	9	2	2
number of levels	5	4	3	1
cultural remains/ level (X)	2.4	2.2	0.7	2.0

Cultural Remains: Artifact Assemblage

The lithic assemblage differs in important ways from the two sites previously described. Bifacial tools are more prevalent here than at the other two sites. Projectile points/hafted cutting tools dominate the tool kit at 23CE324, followed by steeply retouched unifacial flake tools.

The high frequency of cores indicates that primary lithic procurement and reduction took place at the site; the absence of primary lithic elements is probably the result of sampling error. The general tool:lithic debris ratio of 1:5.6 at the site can be inferred to represent the basic lack of stone tool working when compared to 23CE252. In other words, it does not seem probable that from 23CE324 the entire manufacture and maintenance sequence is accounted for in the lithic sample. The tools present at the site were discarded at the site after they were broken, or were lost during some particular on-site activity.

Hunting was the primary activity represented in the tool assemblage. Four Langtry PP/HCTs, 1 shallow corner-notched PP/HCT, and 1 Scallorn arrowpoint were recovered at 23CE324 (Figure 35). Relevant measurements and descriptive information on these tools are provided in Table 21. One Langtry PP/HCT has a tip impact fracture that has been reworked; the haft element has been snapped. The other Langtries have irregular and/or transverse fractures across the blade element.

Again, the occupation at the site would seem to have taken place during the Woodland period or Horizon 1.

The other tool types present at the site are all general food processing tools such as various edged unifaces (Figure 36) and a pitted cobble. These tools could have been used on whatever floodplain food resources were procured at the time of encampment. Not all cherts utilized at the site are represented in the tool sample listed in Table 19. Secondary and tertiary lithic elements of gray and gray-black chert were recovered, but no tool forms of these chert types were recovered. These tools may have been carried off the site when the location was abandoned, and the lithic debris indicative of final tool preparation and/or sharpening was left behind. Alternatively, their absence may be due to sampling error.

Of the artifacts discarded and broken at the site, banded gray-white, white, and mottled white chert were the dominant chert types utilized. Both white and banded gray-white cherts were employed in the production of bifacial and flake tools; the more coarse-grained mottled white chert (with a weathered limestone cortex) was utilized in the manufacture of bifacial tools, specifically two of the Langtry PP/HCTs (Table 22). Thermal alteration was infrequent, but occurred at the more advanced stages of lithic tool production.

Summary

The J. Jones (23CE324) is a small single component Woodland surface scatter near the slumping bank of the Sac River. The high overall incidence of tools, particularly broken and discarded projectile points/hafted cutting tools, and the low incidence of lithic debris beyond the initial testing of river cobbles for suitable flakes suggest this site was the result of a short-term encampment where hunting activities were of primary importance. Some tools were refurbished; other tools were replaced by new ones; and a limited amount of processing of local floodplain foods was carried out.

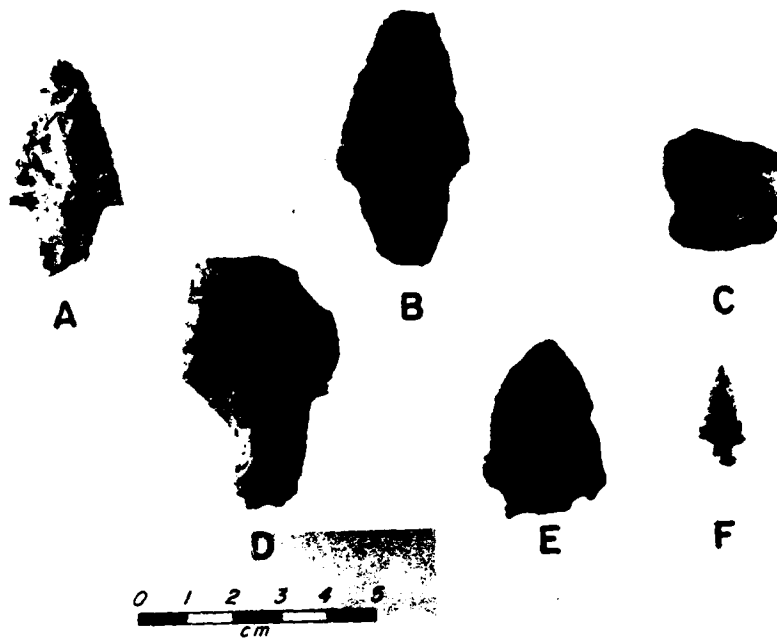


Figure 35. Projectile points from the J. Jones site.



Figure 36. Other lithic tool forms from the J. Jones site.

Table 21

Projectile Point Interval and Nominal Data, the J. Jones Site (23CE324)

Horizontal and Vertical provenience	maximum length (mm)	maximum width (mm)	maximum thickness (mm)	blade length (mm)	blade width (mm)	haft length (mm)	haft width (mm)	neck width (mm)	serration	heat treatment	resharpening/ beveling	raw material ¹	breakage pattern ²	remarks	figure
general surface collection	-	29	7	-	29	18	20	20	-	-	+ ³	2	irregular	Langtry	35B
general surface collection	-	34	7	-	34	24	22	22	-	-	+	1	irregular	Langtry	35D
general surface collection	-	-	-	-	-	25	23	23	-	+	-	2	transverse	contracting stem pp/hct basal frag- ment	35C
general surface collection	40	27	5	33	27	7	16	15	-	+	+	4	irregular	pp/hct corner notched	35E
Transect 4, surface collection	23	11	2	17	11	6	6	5	+	-	-	1	--	Scallorn	35F
Transect 3, surface collection	49	26	6	34	26	15	15	15	-	-	-	3	impact	Langtry	35A

1 = see key to Table 14

2 = after Ahler 1979

3 = presence

Table 22

Lithic Raw Material Utilization, the J. Jones Site (23CE324)

Artifact Classes	Chert Types																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	N
<u>Cores</u>	1	1	4																6
<u>Groundstone</u>																	2		2
<u>Tools</u>																			
flake	3		2																5
bifacial	2	2	1																5
<u>Lithic debris</u>																			
primary																			0
secondary	3		5			1						2							11
tertiary	13	7	15			4			1			2							42
bifacial thinning																			1
N	22	10	28	0	0	5	.0	0	1	0	0	4	0	0	0	0	2	0	72

Local cherts were utilized, but not all cherts utilized by the inhabitants of 23CE324 were collected in the vicinity of the site. Like 23CE235, the J. Jones site would seem to be a short-term, possibly seasonal, floodplain procurement location, albeit one which was used for different purposes. In short, although they are superficially similar, the B. Jones and J. Jones sites appear to represent different roles in the subsistence-settlement system of the Woodland peoples of the Sac River Valley.

The site is presently in cultivation, but erosion does not appear to be significant. No cultural material was observed in the eroding bank of the Sac River, and surface collection information indicated that the density of cultural material increases about 20 meters north of the river bank. Subsurface artifact density is very low across the site, and it is not anticipated that significant information on artifact content or patterning will be obtainable. Some aspects of lithic technology and raw material utilization variability are present in the site artifact assemblage, but this duplicates information recovered from larger samples at 23CE235 and 23CE252.

Summary Interpretations

This section is intended to summarize data classes considered important and necessary in the investigation of the problem domains specified in the research design (Chapter V). The data classes listed here are not the only ones that could be examined; however, these classes have been selected not only because they aid in management goals and in developing the ability to assess more accurately the importance or significance of the resources, but they are major substantive problem areas that are relevant to the known and/or potential information obtainable from the sites and their potential to answer such questions.

Location and Settlement Choice

The relationship between a site and its natural and cultural environmental setting has been the primary focus of previous work in the Downstream Stockton area (e.g. Roper 1977), and in the prairie-forest border generally. This is part of a broader approach that seeks to understand the nature of human-land interaction, differential utilization of various habitats, and the modeling of settlement-subsistence systems during particular periods in prehistory.

The method of settlement pattern analysis utilized in the Downstream Stockton area is site catchment analysis (Roper 1979b; Roper 1977:112-123). The assumptions, techniques, and purpose of site catchment analysis have been summarized recently by Donna Roper (1979b:119-140). As an approach, site catchment analysis:

. . . emphasizes such considerations as the availability, abundance, spacing, and seasonality of plant, animal, and mineral resources as important in determining site location . . . within a demarcated area surrounding a site. That is, sites are conceived of as points at the focus of an area throughout which economic activities were performed (Roper 1979b:120).

The environmental context of the sites is reconstructable, though this was not done as part of this project. Instead, the detailed natural environmental setting, and habitat reconstructions conducted in the Osage basin by F. King (1978a) were valuable sources of analogies and inferences about premodern vegetational communities.

The settlement pattern models for the Downstream Stockton area proposed by Roper (1977:81-96) will be considered insofar as the sites described in this report relate to the evaluation of the models. Site 23CE235, in particular, will be discussed as it relates to Middle Archaic settlement pattern analysis, since its identification as Middle Archaic and a base camp were the primary criteria utilized by Roper to suggest that the site potentially contained significant archaeological information.

The important points in the settlement pattern analysis in this report were:

1. Position within the floodplain of Sac River is an important variable.
2. Several site types (low-high variability in activities conducted at the sites) were recognized within the Sac River floodplain.

Site catchments, utilizing a 1-mile radius to circle the sites, were drawn to refine the specific environmental settings for the sites. Habitats were based on discrete topographic landforms rather than premodern environmental reconstructions since the data were not at hand. Some characteristic vegetational attributes will be enumerated in the discussion that follows.

Site 23CE252 is situated at the edge of a wooded ridge slope overlooking the Sac River floodplain forests. The catchment is dominated by upland forests (on ridgetops and ridge slopes) to the east and north of the site and by the Sac River floodplain to the west (Figure 37). Table 23 summarizes land areas and percentages of the habitat/landform types within a 1-mile radius. A larger radius was not utilized because almost the full range of variability in Sac River habitats is incorporated in the 1-mile radius; upland prairies of more than a negligible size are more than 3 miles distant to the north and east. If resource exploitation from this site was basically localized, we would expect a concentration on floodplain plant and animal foods and a secondary exploitation of the forest products of the open upland woods. The site is centrally located to exploit both bottomland and upland resources. There are no obstacles to the ready exploitation of either area; access to the uplands is accomplished by a short trek up the gentle ridge slopes. More open habitat plant and animal foods would likely be present on the upland ridgetop. Backwater/slough fish and mussels could be collected in the floodplain which is close by. The Sac River channel is now adjacent to the site, and examination of aerial photographs at the Cedar County Soil Conservation Service office suggests older secondary channels in the floodplain and at the base of the ridge slope.

Contemporary Woodland sites, to which 23CE252 probably articulates, are sites 23CE251 and 23CE255 in the floodplain of Sac River immediately to the south. Site 23CE255, in particular, is suggested to be a village similar to Flycatcher and Dryocopus in Stockton Lake (Roper 1977:91). Low assemblage variability sites such as 23CE251 and 23CE252 occur in conjunction with a more permanent residential base; the low variability

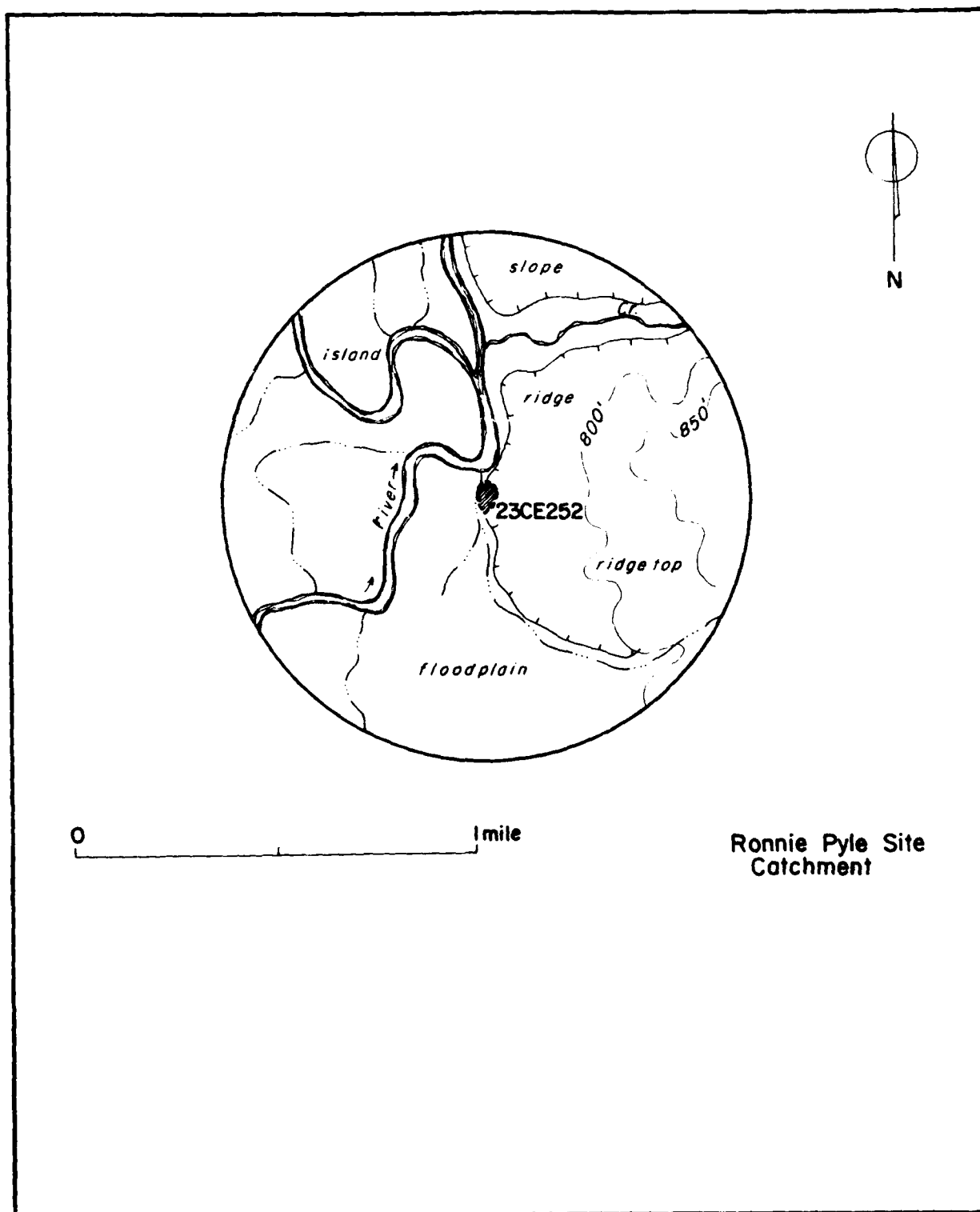


Figure 37. Ronnie Pyle site (23CE252) 1-mile site catchment.

Table 23

Site Catchments, 1-mile Radius from Site

	23CE252	23CE235/CE324
<u>Habitat</u>		
Area (miles ²)		
Sac River	.05	.02
floodplain	.91	.72
ridgetop	.34	.61
ridgeslope	.18	--
bluff	--	.22
tributary floodplain	<u>.10</u>	<u>--</u>
Total	1.58	1.58
<u>Percentage within radius</u>		
Sac River	3.2	1.3
floodplain	57.6	45.6
ridgetop	21.5	38.6
ridgeslope	11.4	--
bluff	--	13.9
tributary floodplain	<u>6.3</u>	<u>--</u>
Total	100.0	100.0

$$\chi^2 = 38.62^1 \quad df = 5 \quad p = <.001$$

¹Refer to the Glossary for the definition of χ^2 , df, and p.

sites are dispersed then in other niches. These sites were probably utilized to a much more limited extent seasonally, and in a diachronic perspective, than those residential bases adjacent to Sac River. A maximum redundancy in the range of activities conducted at the latter site "type" is evident simply through reoccupations, while the lesser and/or smaller sites seem to have a minimum of redundancy between them.

Both sites 23CE324 and 23CE235 are located on floodplain features in the broad bottomlands of the Sac River (Figures 38 and 39). The catchments are dominated by floodplain forest and prairies on all sides with substantial components of upland ridgetops and bluffs (Table 23). The bluffs border the floodplain for a 2-mile distance both above and below the sites, and restrict direct access to the uplands on this side of the river. Wooded ridgetops are present to the west, and upland prairies were probably present on the level ridgetop to the east of the sites. Perhaps the most important habitat is not included in the summation of nearby habitats--the old channel of the Sac River that meanders across the



Figure 38. The floodplain of Sac River in the immediate vicinity of the B. Jones (23CE235) and J. Jones (23CE324) sites.

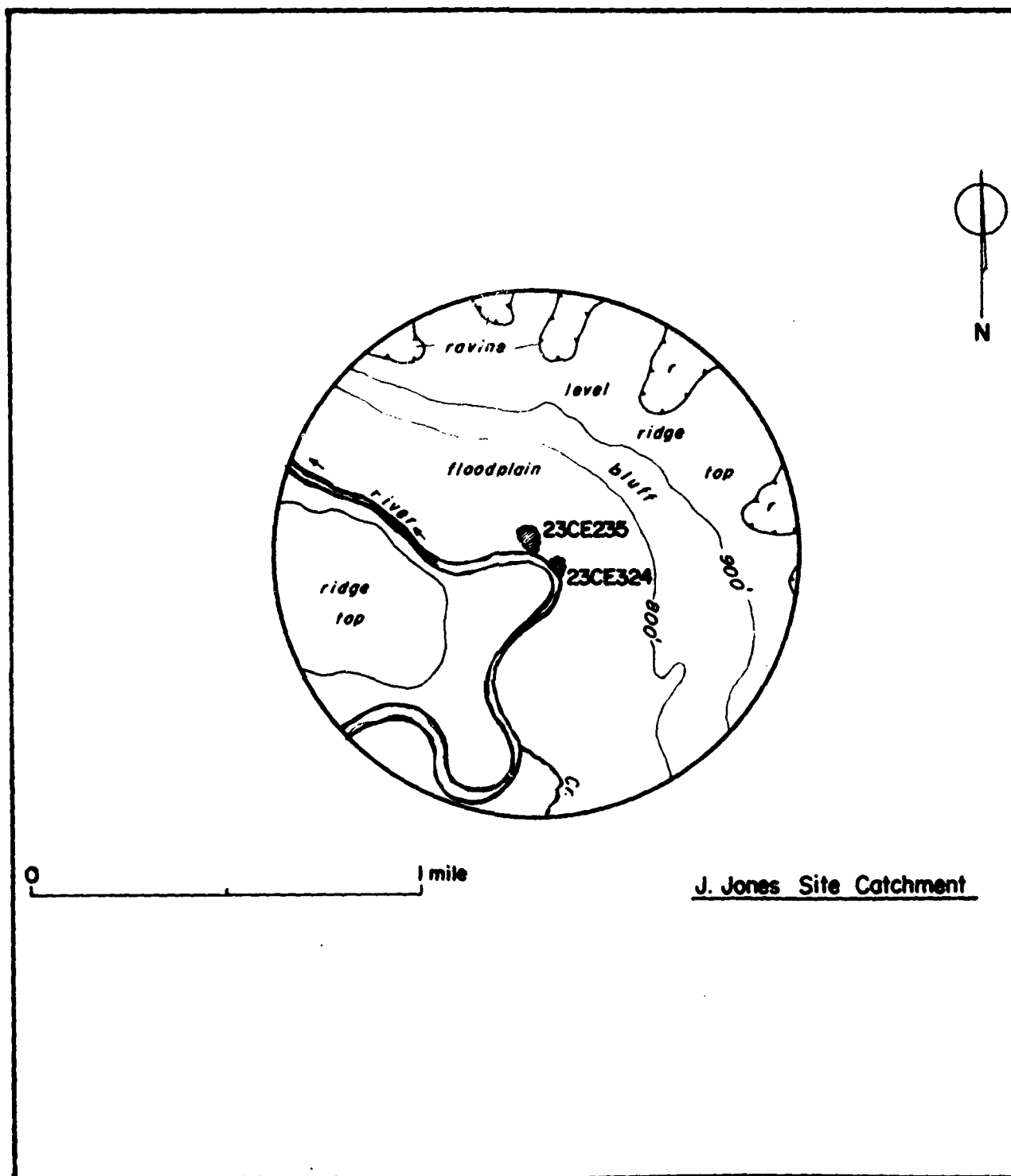


Figure 39. J. Jones (23CE324) and B. Jones (23CE235) sites, 1-mile site catchments.

floodplain. All six of the prehistoric archaeological sites in this large bottomland are associated with this channel rather than with the present channel of Sac River (Figure 20).

If the basic pattern of resource exploitation was localized (i.e. the majority of resource procurement activities took place within the catchment), floodplain plant and animal foods would be expected to be of primary importance. Upland resources (mast and open and closed habitat animal species) are present less than $\frac{1}{2}$ mile to the west. Backwater/slough fish and mussels could have been collected from the channel of the Sac River. Both marsh aquatic and bottomland prairie food species (not quantified in Table 23) would be a consistent component of the floodplain zone, along with bottomland forest species.

The sites within the floodplain zone can be grouped in two general "types": 1) hunting and gathering stations for floodplain resources, and 2) probable base camps located near the base of the bluff and centrally located base camps near the river (Roper 1977:88-94). The base camps located near the bluff base appear to have been occupied primarily during the Late Archaic, while the base camps nearer to the river date to the Woodland period.

In the case of the settlements in the Jones bottoms (see Figure 20), the conjunction of two important variables seems to play a major role in the location of settlements: proximity to the bluff base as well as immediate proximity to a channel of the Sac River. The hunting and gathering/limited variety sites are located farther from the bluff base in the floodplains, but are relatively close to probable base camps.

The Woodland settlement pattern can be summarized as:

1. Multi-seasonal base camps with permanent structures; extensive number of maintenance and extractive tasks carried out (evidence: Flycatcher); horticultural activities?
2. Rockshelters; seasonal procurement stations, storage, and social tasks--burial disposal (evidence:Table 3)
3. Cairns; mortuary activities (Bolivar and Stockton complexes)
4. Seasonal hunting and gathering stations--for upland and floodplain resources (evidence:23CE252)
5. Seasonal hunting and gathering stations--floodplain resources (evidence:23CE235)
6. Seasonal hunting camps--floodplain and/or upland resources (evidence:23CE324)

Nature of the Artifact Assemblage

The artifact assemblages present at the sites are assumed to reflect the nature of the activities performed there and their function in the local settlement system.

At each site a series of extraction and maintenance activities was performed, with evidence present not only in the form of the tools present, but with unfinished/broken tools, debris, and worn tools. Table 24 presents summary comparisons of tool forms from the three sites. There is a common core of activities related to hunting, maintenance of the stone tool kit, and the processing of animal and plant foods:

PP/HCT--arrowpoints, flake tools, pitted cobbles, cores, lithic debris, and fire-cracked rock.

Table 24

Summary Characteristics of Tools¹ from the Three Sac River Sites

	23CE252	23CE235	23CE324
thick biface	7.1 ¹	8.0	0.0
thin biface	7.1	6.4	0.0
PP/HCT	10.7	9.5	45.5
arrowpoint	7.1	3.2	9.0
unifacial scraper	7.1	12.7	9.0
steeply retouched uniface	50.0	47.6	27.3
spokeshave	3.6	1.6	0.0
pitted cobble	3.6	6.4	9.0
ground cobble	3.6	0.0	0.0
graver	0.0	1.6	0.0
perforator	0.0	3.2	0.0
N	28	64	11

1 = percentages

chi-square = 13.7; probability <.10; degrees of freedom = 8

Table 25

Concentration Indices¹ from the three sites on Sac River

	23CE252	23CE235	23CE324
lithic debris	437 ¹	69	16
biface-tools	1.2 7 11.2	2.5 7 7.5	0.0 7 0.8
flake tools	10.0]	5.0]	0.8]
firecracked rock	7.0	3.3	2.3

1 = number of items per cubic meter of deposit

chi-square = 24.97; probability <.001; degrees of freedom = 6

The statistical examination of the lithic assemblages indicates that they are significantly different at the 0.10 level of significance (Table 24); 2 X 2 contingency tables suggest that 23CE324 and 23CE235 are more similar to each other than either is to 23CE252. However, as a class these assemblages indicate a high degree of overlap in the presence of particular maintenance and extractive tasks.

From an examination of the intensity of occupation it appears that there are significant differences between the sites in the subsurface densities of cultural material; this presumably reflects factors such as reoccupation and length of each occupation. The subsurface density at 23CE324 is ephemeral by comparison to 23CE252 (Table 25). The general lack of fire-cracked rock suggests a localized use of seasonal resources, with floodplain edge sites (e.g. 23CE252) representing hunting and gathering stations for animals, nuts, and seeds from both upland and bottomland habitats and with the floodplain sites representing more restricted hunting and gathering or hunting stations articulated with seasonal floodplain edge sites, multi-seasonal floodplain base camps and caves/rock shelters. It is not known how the cultivation of native and tropical cultigens relates to the Woodland settlement pattern, and with what part of the settlement pattern it most likely will be identified.

Of the few open floodplain Woodland (non-base camp) sites investigated in the Stockton Reservoir, 23DA231 is very similar to 23CE235: 5.9 tools/cubic meter, and 21 pieces of lithic debris/cubic meter. Site 23DA223 has a tool density of 30 tools/cubic meter, and perhaps represents a more dense occupation of the same class as 23CE252. Projectile points/hafted cutting tools and arrowpoints constitute less than 20 percent of the tool kit (Wood 1965:179-183).

Lithic Raw Material Utilization

Lithic raw materials from local river gravels were identified as the exclusive raw material utilized in these lithic assemblages. Cherts from the Burlington, Chouteau, and Jefferson City formations have been redeposited in stream gravels and were the most important source of chert for prehistoric toolmaking.

There are differences in the relationship of raw material types with associated tool use behavior (see Tables 14, 18, 22) as well as frequencies of the different raw material types (Table 26). Because of the quality of local cherts (i.e. fine-grained chert with natural sharp edges), local cherts were utilized for all morphological tool classes where a sharp or more durable edge was required. The abrading and gritty characteristics of the sandstones were suitable in the grinding and pounding of foodstuffs. This material was also locally available and could be simply shaped to produce tabular grinding slabs and hand abrading tools.

There are significant differences in the quantities of chert raw material types utilized at the three sites; in particular, chert type 1 ranks higher in frequency at the two sites closer to Stockton Dam, while chert type 3 is more common at the site farther downstream (23CE252). The differences probably do not represent preferences for a particular lithic resource as much as they reflect access to localized raw material procurement areas such as proximal river gravels. The composition of river gravels should be variable because of the variable bedrock exposures on the Sac River and secondary tributary streams.

Table 26

Lithic Raw Material Utilization Comparisons¹

Chert Types	23CE252	23CE235	23CE324
1 ²	22.7 ¹	33.3	30.6
2	5.1	3.5	13.9
3	39.4	32.2	38.9
4	3.7	2.2	-
5		0.2	-
6	8.0	10.6	6.9
7	0.6	0.6	-
8	0.2	0.2	-
9	0.2	2.7	1.4
10	0.6	0.8	-
11	2.3	1.4	-
12	6.8	3.7	5.6
13	4.0	5.3	-
14	2.6	-	-
15	2.8	1.8	-
16	-	0.2	-
17	0.2	0.8	2.7
18	0.6	0.6	-
N	816	491	72

1 = percentages 2 = see key to Table 14 chi square = 44.6

probability = <.001 df = 10

Other differences in the lithic assemblages are accountable from three processes: 1) the relative utilization of heat-treated material, 2) the length of time the tool is to be utilized, and 3) the place of initial tool manufacture. With regard at least to the lithic debris, such factors as criteria of luster contrast, degree of luster, conchoidal ripples, heat scars (pot-lid fractures), in combination with a color change (Rick 1978:57-59) suggest that heat treatment is twice as common in the assemblages from 23CE252 and 23CE235 when compared to 23CE324. Further aspects of thermal alteration are considered in the next section.

Tools designed for lengthy periods of use will leave little or no trace of their presence at sites if they are not broken or manufactured there. Some of the tertiary elements from chert raw materials without tool representation likely represent final preparation or resharpening, and the tool was then carried away to be utilized at a different loci. The most frequent raw materials at each of the sites are represented by the complete manufacturing sequence including cores, primary-tertiary debris elements, and tools broken in-process; the less frequent raw materials tend to include only selected elements in the process.

Lithic Technology

The infrequency of bifacial tools, preforms, or bifacial forms indicative of a tool in-process contrasts with the frequency of flake tools and the presence of free-flaked cores (Cook 1976:26-27), which were sources of flakes. As conceived here, the initial detachment of flakes from a river cobble (the primary element) is followed by the production of debris with lesser amounts of cortex and gradually smaller sizes (Raab et al. 1979:176-177). The relatively high frequencies of tertiary lithic elements at each site suggest that the final stages of lithic tool manufacture, maintenance, and rejuvenation of larger tools were emphasized (Table 27). A biface technology and a core/flake technology were both utilized; the high ratio of cores to bifacial implements, etc. suggests that a core technology was the primary means of lithic tool manufacture (Lynott 1980a:233). Some of the projectile points/hafted cutting tools were manufactured on flakes; cortex was still discernible as the flake platform on the distal end of the PP/HCT stem.

The presence of cores with primary and secondary elements does imply that initial manufacturing and/or raw material procurement and chert quality testing took place during the occupations of the three sites. The emphasis was, however, away from initial fabrication. Initial fabrication of many tool forms, as suggested by the patterns of raw material utilization, was accomplished at the more permanently occupied base settlements. The chi-square analysis points out that the tool manufacturing and maintenance activities performed at the three sites differ significantly. The variable quantities of discarded cores and primary elements are the two most significant factors to consider in the identification of the stages of the manufacturing process present.

Heat treatment was done at two different points in the production of stone tools. At 23CE234 cores were heat-treated after initial core preparation, and then flakes were struck from the cores. No cores were heat-treated at 23CE252 or 23CE324, but secondary and tertiary lithic debris elements with evidence of heat alteration are common; therefore, heat treatment was applied at the more advanced reduction stage (i.e. as final bifacial forms were shaped?).

Table 27

Summary Characteristics of Lithic Debris¹ from the three Sac River Sites

	23CE252	23CE235	23CE324
primary element	1.4 ¹	2.1	0.0
secondary element	21.9	29.0	17.7
tertiary element	73.9	62.6	70.9
bifacial thinning	0.9	0.2	1.6
core	1.9	6.0	9.7
N	787	433	62

¹ = percentage

chi-square = 31.04; probability <.001; 8 = df

Cultural Sequence

The recognition and development of a sound temporal sequence and the positive chronological ordering of site components are essential if processual and diachronic questions are to be asked, and have the potential to be explained. The culturally stratified and absolutely dated remains from the Pomme de Terre Valley, particularly stylistic changes in projectile point series, can be utilized with a minimum of "noise" to define the cultural sequence in the Sac River watershed. However, considerable refinement in the cultural sequence is necessary to reduce the length of the temporal horizons defined from Rodgers Shelter (e.g. Kay 1978). This can be appreciated when it is considered that the Woodland period as presently defined has a 750-year time span. Within this period, a number of projectile point types are present, and the temporal overlap is considerable.

In lieu of absolute dating of archaeological assemblages, the identification and definition of single component occupations are important to avoid mixing data from different temporal and/or functional occupations. Too often multicomponent sites have been utilized in examining prehistoric settlements or in attempting to isolate cultural assemblages where separation of the various components was not possible. The net effect has been a lack of substantive results on many archaeological questions that suitably require contextual integrity.

All three sites considered here were occupied in Horizon 1, the Woodland period (Table 4), and are defined by the presence of Langtry PP/HCTs and Scallorn arrowpoints (Kay 1978; see also Table 4 above). Except at 23CE235, there was no evidence (temporal data, intra-site data, or site function data) to suggest that the sites are a product of more than one period of occupation, and they are considered single component Woodland sites. The arbitrary subdivision of the Woodland

period into earlier sites with dart points and later sites with arrowpoints (including the sites investigated here) could not be substantiated with the artifactual data from this project. Both tool forms appear to have been contemporaneous and integral parts of the Woodland tool kit. The general contemporaneity between the three sites established by the projectile point series did increase the information potential of each site since it could be assumed that the sites represented discrete cultural components of a distinct contextual nature; the demonstration of integrity for these components showed them to be useful in subsequent analyses and in the investigation of substantive problems.

Intra-site Planning

Spatial data on the distribution of tasks and activity sets on a site are potentially informative on activity areas, evidence for socio-political organization, group size, settlement segmentation, and more generally about how the site inhabitants utilized the local territory/environment, and, therefore, informative about broader questions concerning regional land use patterns. At the scale of intra-site planning, the concern is with determining internal differentiation on a site and how this relates to internal social complexity within cultural groups.

Single component sites are particularly amenable to analysis of intra-site structure. Systematic surface collections, shovel testing, and randomly spaced test units were designed specifically to gather information on spatial patterning and the dimensional character of the site components. In each case where information was sufficient, it was possible to conclude that the site components were the product of one primary occupation or phase of artifact deposition. The distribution of artifacts had a simple one-dimensional character characteristic of low density concentrations. The lack of subsurface data and the general small site size would normally preclude archaeological investigations of any scope, but such data are a particular plus in the identification of single component, functionally "specific" sites (e.g. Talmage and Chester 1977).

Chapter VIII

SIGNIFICANCE OF THE SITES AND NATIONAL REGISTER OF HISTORIC PLACES CONSIDERATIONS

There is a wide latitude in the criteria of significance by which archaeological remains can be determined eligible for the National Register of Historic Places. Under the Federal criteria (36 CFR 60) almost any site can be justified as significant because it will produce some information about the past. Realistically, within cultural resource management frameworks this decision has come most frequently to relate directly to research data potential, relevant research questions, and a regional research and problem-oriented perspective (T. King 1981; Raab and Klinger 1977; Raab et al. 1980:543). Barnes et al. (1980:551) note that because National Register criteria are based on national, state, and local significance "it allows and promotes the development of regional approaches to understanding archaeological site significance."

However, because the nature of scientific research is dynamic and changing, significance evaluations also should be dynamic (cf. Lynott 1980b). Thus, it should be evident that the research value of any resource base is subject to the demands of present and unknown future research problems. Evaluations of research significance, therefore, should be based as much as possible upon not only a broad-based program of substantive research problems that makes use of recognized data potentials but also on an appreciation of the nature of the regional data base and the state of archaeological knowledge. Because a site cannot be incorporated into currently recognized problem-oriented research designs is no sure guarantee that the site could not be considered significant (e.g. Sharrock and Grayson 1979:327); it is, however, a strong argument for limited data-producing potential when measured against a broad range of substantive, methodological, or theoretical questions (contra Raab and Klinger 1979:329) that ensure significance determinations with archaeological meaning (Klinger and Raab 1980:554).

The general orientation of the Downstream Stockton testing project for significance evaluations was the incorporation of regionally and locally relevant research problems (suited to the class of archaeological remains being investigated) with the collection of management information on site-specific integrity and states of preservation. The development of research problems of concern here was based upon major regional research orientations adopted by previous investigators (e.g. Roper 1977; Kay 1978; Wood and McMillan 1976), general questions related to variations in lithic raw material manufacture and maintenance, and how the content and variability of lithic assemblages could be expected to vary with the activities carried out there, and thus refer to differences in site function. Each problem began with a discussion of its relevance, i.e. how it relates to the archaeological record of the region, and then moved to development and refinement of the problems with respect to pre-historic limited activity sites and their role in considering how humans utilized the region in the past. Basically what was to be determined was whether there exists a reasonable probability that the sites contain information that can contribute to the resolution of each research problem; will they contain new data or will they provide a more representative sample of the archaeological record of the region to be evaluated?

In the prairie-forest border in southwestern Missouri, small, limited activity sites have not been adequately investigated or assessed. Only two possible limited activity sites have been examined in any respect beyond grab sample surface collections in the Sac River basin (Chapter IV). In instances where one is dealing with nomadic, non-sedentary, and semi-sedentary settlement-systems, small specialized and relatively small activity sites can be expected to occur with considerable frequency; this is certainly the case in the Downstream Stockton area, and probably also the case in the Stockton Lake area. It is here in these situations, given the recognition of single component occupations in the project area, that direct evidence of procurement activities and functional differences, as the results of variations in energy resource distributions, can be adduced in a temporal perspective. Settlement systems are complex and dynamic, and to be able to explain and understand such systems adequately, it is necessary to be able to identify the variety of functionally different site types that exist within different systems or temporal periods, and to establish the range in variation (assemblage content) within the settlement system components.

The documentation and evaluation of the nature and character of a series of different settlement or functional components should allow for the increasing efficiency and effectiveness of archaeological research as well as provide necessary information for assessing significance within the prairie-forest border. The generation of an archaeological data base for making informed management and scientific decisions will be of considerable importance in the development of organized approaches to the recovery of archaeological data and the preservation of archaeological resources at the state level.

In the discussions that follow on the significance of each of the sites, assessments of eligibility will be based on the nature and integrity of the resources (Chapter VII), and on each site's further potential towards contributing useful information on the research problems developed herein (Chapter V).

Sites 23CE235 and 23CE324

Intensive investigations at these two prehistoric sites suggest that neither site is likely to yield additional archaeological data which would qualify it for inclusion in the National Register of Historic Places. Both sites have produced noteworthy information with regard to the various research problems, but it is felt that further work would be unnecessary because adequate and representative samples of data have been secured, and it is unlikely that important new information would be forthcoming.

Both sites have low frequencies of prehistoric artifacts on the surface, little to no subsurface information, and/or a limited further potential to generate data beyond that already collected. Other archaeological properties (e.g. 23CE252) can be better utilized to address research questions which are most relevant to these two sites. That is, if the data-producing potential of the sites cannot be used fruitfully to answer significant research questions, then data recovery should not be necessary (Advisory Council on Historic Preservation 1980:12). If the data recovery program expenditure of funds cannot be justified with reference to those questions, further work would only be redundant.

Granted, sites of this type can be potentially relevant to research

problems in the region, but not all sites of this type need to be considered significant. Other sites with surface and subsurface integrity, intra-site patterning, and potential to generate data relevant to a variety of research problems would possess National Register qualities. This is not to say that sites without these qualities cannot aid in the development or answering of meaningful research questions (and we have seen that both sites can do so), but is only to point out that the problems inherent in working with such sites limit the scope and substance of research.

The surface material collected and the disturbed context of the limited subsurface data suggest that the potential is minimal for these sites to yield additional information. Levee slope erosion at 23CE235 has adversely affected the surface distribution of artifacts, and it is not possible to associate surface and subsurface data adequately. At 23CE324 only a limited number of artifacts were present in either surface or subsurface context, and it is unlikely that many artifacts remain at the site. The information content of the subsurface deposits was very low, and the data present would not seem to occur in sufficient quantities either to provide answers to the research problems identified above or to justify the expenditure of additional time and funds.

Both sites have been identified as limited activity sites. There are many other examples of limited activity sites in the Sac River basin, some of which undoubtedly have better potential for information.

To summarize, in our opinion neither site would likely qualify for inclusion in the National Register of Historic Places based on our observations of the character of the sites. The maximum research potential of the two sites was probably realized by the Phase II evaluations conducted here.

Site 23CE252

The significance of 23CE252 is related to several factors. First, the site appears to represent a small, single component, limited activity site. Because it is single component, the data it contains can provide a variety of information from one reconstructed period in time, and thus more suitably can contribute to the investigation of the archaeological research questions posed earlier.

The site is small (3800 m²) and has a shallow cultural deposit (25 cm), but the surface and subsurface data gathered during the Phase II testing program indicate that the integrity of the archaeological deposits at the site is good. The archaeological deposits at the site have been subjected to plowing in the past, but this has not tended to remove contextual information between surface and subsurface assemblages or altered the distributional patterns of cultural materials across the site. The general spatial pattern of artifact distribution suggests that the site is the result of one short period of occupation and the vertical and horizontal displacement of artifacts is limited, thus enabling the definition of intra-site patterning. No evidence was found that botanical or faunal material is present or preserved at the site, and cultural features were not exposed or recorded in the limited subsurface testing (0.002% of the cultural deposit). The soil contrasts are sufficiently clear so that if features are present and extend into the sterile subsurface soil they can be easily demarcated.

Low and high density concentrations of cultural material are present on the site and the general spatial patterning can be at least

partially reconstructed from the present data. Artifacts do occur in sufficient quantities in subsurface contexts to ensure that information can be obtained on the total site assemblage content, the definition of intra-site variability in extractive and maintenance tasks, and the archaeological context of disposal (e.g. Binford 1978:344). Another important aspect of 23CE252 concerns its potential to contribute to the evaluation of Woodland settlement pattern models, and in the documentation of variability in assemblage composition, intra-site planning, and seasonal patterns of occupations of special purpose sites as they can be expected to vary in relation to the activities carried out there.

While the settlement pattern models have not been evaluated during this Phase II testing project, they served as guides in formulating known and expected data categories and in the development of possible and future research programs concerning limited activity sites and inter-site relationships in settlement systems.

Past research in the major river valleys of the prairie-forest border of the western Ozark Highland has focused almost exclusively on selected components of regional settlement-subsistence systems, primarily caves/rock shelters, and burial cairns, while other aspects of the archaeological record have basically been ignored. Yet as Roper (1977) and others have indicated in regional studies of settlement systems, there is a great range in inter-site variability in the way local populations organized for subsistence purposes, as well as in the patterned variability in assemblage composition and site location which are ultimately referable to differences in site function.

Following Binford (1978, 1980), these differences represent a basic functional dichotomy between maintenance and extractive sites, with each site type having a well-developed spatial and seasonal character. Roper recognized the major distinction between residential or base camp maintenance sites and special purpose or limited activity extractive sites in the Downstream Stockton area for the Woodland period but with additional data it is possible to amplify considerably this model of settlement systems developed for the Sac River basin.

A recent article by Binford (1980) on hunter-gatherer settlement systems discusses two basic organizational differences in carrying out subsistence strategies that seem to condition and determine settlement organization. In forager strategies settlements are mobile in response to their strategy of moving base camps to the location of resources, while in logistical strategies the specific resources are gathered and carried to the residential bases. Settlement systems based on logistical strategies are more complex in terms of inter-site functional variability because they are generated in response to gathering variable distributions of critical resources as well as from organizational requirements (Binford 1980:17-18). Site types expected for settlement systems with logistic procurement strategies are suggested to include: a residential base, a location, a field camp, a station, and caches.

The reevaluation of the Woodland period data base for the Sac River basin indicates that the archaeological record for this period can be hypothesized to represent generally a logistically based settlement strategy (Chapter VII:Summary Interpretations). Rock-shelters and caves can be identified, at least in part, as cache sites where temporary storage of resources occurred; specific procurement activities or locations can also be identified in the record. Small villages like Dryocopus and Flycatcher (Calabrese et al. 1969) are the residential bases at which

logistically organized food procurement parties were planned, storage and other maintenance tasks were concentrated, and major social activities occurred. Seasonally occupied extractive sites are identified as locations, and they are situated in the floodplain, at the floodplain-upland juncture, and in the uplands, located with respect to specific types of critical resources, and possibly differentiated by seasonal variations in occupation and by functional differences related to the procurement and/or processing of specific sets of resources.

Site 23CE252 is important because it will furnish data on limited activity sites in Woodland settlement systems in the Sac River floodplain. Using precepts formulated by Binford (1980) and site catchment analysis, it will be possible to develop expectations about the content and structure of limited activity sites, and the roles they play in the local settlement system. Since the site contains information about assemblage functional variability, technological parameters of Woodland lithic tool production, the character of limited activity lithic assemblages, internal site organization, and a variety of other research problems, it can be related to more general questions of land use patterns and used as a general test case for refining models of Woodland settlement systems. Specific questions such as: "Are there significant intra-site differences in artifact distributions, and do they represent different functional activities?" or "Do the functional inferences gathered from the analysis of the tool types correspond with the inferences about resource exploitation and selection derived from site catchment analysis?" from which specific hypotheses can be formulated can be generated for the individual limited activity site as it relates to proposed functional differences.

Testing of the hypotheses related to the logistic strategy of Woodland settlement systems is dependent upon the identification, documentation, and evaluation of the other representative site types (i.e. residential bases, caches, etc.) in a comparative framework where significant inter-site differences in content, structure, and spatial distribution will be expected and the regional information can be used as specific tests.

This site type is as yet poorly preserved and inadequately represented in the archaeological literature of the prairie-forest border, though, with the increasing attention to adaptation and land-use patterns, small specialized sites become increasingly important not only in evaluating different models of settlement but in terms of their ability to contribute new information on understanding land-use strategies and archaeological site patterning on a comprehensive level.

Accordingly, based on these substantive research problems and the site's potential to contribute further and new information, the Ronnie Pyle site, 23CE252, is assessed as significant under the Federal criteria for the National Register of Historic Places as outlined in 36 CFR 60. The site is not considered to be of national significance, but significant on the regional and local level.

Chapter IX

RECOMMENDATIONS

It has been recommended that additional consideration be given to the Ronnie Pyle site, 23CE252, one of the three prehistoric sites tested and evaluated during the course of this project. This site has been assessed as eligible for inclusion in the National Register of Historic Places, and pursuant to regulations of the Advisory Council on Historic Preservation (36 CFR 800.4), impacts of the project are reviewed and mitigation alternatives are considered for this site.

Impacts to 23CE252

When the scope of work was prepared originally for this project site 23CE252 was described as being "directly impacted by the construction of channel cutoff #4", and hence would be adversely impacted by construction activities. However, between the time the scope of work was prepared and the completion of the present report, we have been informed by the Kansas City District of the Corps of Engineers that the construction plans for channel cutoff #4 have been redesigned so that neither primary nor secondary impacts will adversely affect 23CE252. No specific construction plans were available to these investigators, therefore limiting the discussion of impacts or the evaluation of potential adverse effects on the site.

It is recommended that if the site becomes impacted in the future, these activities be furnished to the Missouri Historic Preservation Program so that agency officials and the State can, in consultation, adequately consider the land alterations to the site and conduct an adequate review of the proposed effects and apply the Criteria of Effect (36 CFR 800.4(B) and 800.3(a)).

Mitigation Alternatives at 23CE252

As a result of the Phase II test excavations at 23CE252, and the data gathered from the site, the site has been assessed as significant (see Chapter VIII). Therefore, it is recommended that the U.S. Army Corps of Engineers request for this site a determination of eligibility for inclusion in the National Register of Historic Places. Although the site will not be directly impacted by the project as redesigned, mitigation alternatives to avert future adverse impacts are considered.

The preferred mitigation alternative is to seek the in-place preservation of 23CE252 (see Advisory Council on Historic Preservation 1980:16). Avoidance and/or preservation of the site should be the primary considerations in the planning for any future projects which might impact the site.

Should avoidance or preservation in place not prove to be an appropriate alternative, mitigation through data recovery would be the other preferred way to avert adverse effects on the site.

The development of a Phase III mitigation program should be related directly to the development of research problems that take into account the known and expected research value of the site, as well as the recovery

of a representative sample of data sets that can contribute to the investigation of problems not recognized at the time of data recovery (e.g. Lipe 1977:34-36). The development of research designs should be the first phase of the excavation project. While it is not the purpose of the recommendations to develop research questions, it is suggested that research problems be centered on topics such as:

1. The nature of limited activity sites in the Woodland settlement-subsistence systems on the prairie-forest border; season of occupation; relationship to base camp villages and other site types.
2. Utilization of the floodplain of the Sac River; methods of procurement, processing, and preparation of foodstuffs; land-use patterns; procurement of locally available lithics and other raw material resources.
3. Development of a lithic research design emphasizing the functional analysis of the lithic assemblage, the utilization and procurement of lithic raw materials, the different processes involved in selecting raw material for particular activities; production technology including the use of heat treating.
4. Relationships between lithic assemblages and settlement-subsistence strategies, i.e. as a test case for the hypothesis that the character of lithic assemblages will vary in relationship to synchronic and diachronic changes in settlement-subsistence strategies.
5. The spatial patterning of activities in limited activity sites.

The excavation or mitigation program should be developed in terms of the data sought from the site, and should employ methods of data recovery that ensure the recovery and description of the complete range of archaeologically observable activities and culturally relevant environmental data at the site. A primary concern should be that mitigation program be of sufficient scale so that a representative portion of the site is studied.

Before the proposed plan for mitigation of adverse effects is discussed, several considerations should be mentioned. First, the site is located in an agricultural field and it should be necessary to conduct and complete the excavation while the site is in pasture rather than while it is in row crops. Second, the differences in soil moisture content across the site sometimes make hand screening a laborious process; provisions for implementing pressurized water screening to increase the efficiency of screening should be considered.

On the basis of the present evidence, 23CE252 can be divided into an area of relatively high artifact density and an area of low artifact density (see Chapter VII). The area of high artifact density encompasses 600 meters square, or 15.8 percent of the total site area, with the remainder included in the low density area (3200 m²).

The core concentration area should be given greater focus, but both areas of the site should be sampled. Better estimates of population parameters (i.e. artifacts) can be made by sampling areas unequally, with more sampling units placed in the areas where artifact density is high.

The determinations of sample fractions and sample sizes (percentage excavated) should be the product of recommendations from both state and Federal agencies in consultation with interested archaeologists, and it is not something that can simply be specified out-of-hand. As Corbyn notes (1980:14):

The amount of data recovery needed depends on the kinds of information derived from the evaluation, the degree to which the archaeologist is able to document the cultural significance of the information, and the extent of archaeological study and knowledge of the region.

In this case, we are confronted with a small, single component site with shallow depth and various spatial densities of lithic artifacts. To be statistically confident of the site's content and structure (see Chapter V for definition of content and structure as used here) an extensive and intensive excavation program will be necessary. This proposed plan consists of three inter-related stages:

1. The excavation of a large horizontal block of units in the high density area;
2. A minimum areal sample from the low density area; to include noncontiguous and small contiguous test units as needed;
3. Removal of the disturbed cultural deposit (plowzone) with earth-moving equipment (road grader or light bulldozer) to obtain records of possible features present to define intra-site spatial patterning in conjunction with artifact distribution variation.

The three stages of excavation should include approximately six weeks of field work for a crew of four, including a project director and assistants. A similar length of time would be required to complete direct and ancillary analyses and for the preparation of a report describing the work undertaken at the site, and the scientific results of the project.

Impacts to Sites 23CE324 and 23CE235

Since the sites do not appear to be eligible for inclusion in the National Register of Historic Places, erosion of the Sac River bank at these locations will have no effect on significant archaeological resources, and no recommendations for mitigation are made. The possibility remains, however, that buried cultural resources are present in the Sac River floodplain between the present site boundaries and the Sac River cutbank. If such cultural resources are discovered, the Missouri Department of Natural Resources, Historic Preservation Program should be notified immediately; the potential significance of the resources should be assessed, and, if necessary, a mitigation plan should be developed.

Chapter X

CURATION

Cultural material from the Ronnie Pyle site (23CE252) is presently curated at the Center for Archaeological Research, Southwest Missouri State University, Springfield, Missouri, in containers clearly marked as property of the U.S. Army Corps of Engineers. This cultural material was cleaned, labeled, and appropriately curated, and will be made available to that agency upon request.

As stated in the right-of-entry secured for sites 23CE235 and 23CE324 on the property of James Jones in Stockton, Missouri, all cultural material was to be returned to the landowner immediately after the laboratory analyses were completed. Before this was done, all diagnostic tool types were labeled with the Archaeological Survey of Missouri site numbers, and black and white and color photographs were taken of selected examples of the lithic artifact classes recovered. Site specific provenience information was also supplied to Mr. Jones to encourage the recording and labeling of such information on other sites on this property.

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Federal Regulations and Related Documents

- 36 CFR 800 Procedures for the protection of historic and cultural properties.
- 36 CFR 1201 Criteria for comprehensive statewide historic surveys and plans. (42 FR 47658).
- 36 CFR 1202 National Register of Historic Places (41 FR 5904). Formerly 36 CFR 60.
- 36 CFR 1204 Determinations of eligibility for inclusion in the National Register of Historic Places (42 FR 47661). Formerly 36 CFR 63.
- 36 CFR 1210 Recovery of scientific, prehistoric, historic, and archaeological data: methods, standards, and reporting requirements (42 FR 5374). Formerly 36 CFR 305.
- 45 FR 78808 Advisory Council on Historic Preservation Executive Director's procedures for review of proposals for treatment of archaeological properties; supplementary guidance.

It is the policy of Southwest Missouri State University not to discriminate on the basis of race, color, age, sex, handicap, religion, or national origin in its educational programs, financial aids, activities, admissions, or employment policies.

APPENDIX I

**Inventory and Provenience of Artifact Data:
23CE235, 23CE252, and 23CE324**

Site 23CE235

23CE235: GENERAL SURFACE COLLECTION, MAY 1981

Bag #1

- 1 thin biface, white chert, heat treated

Bag #2

- 1 pitted cobble (pits on dorsal and ventral surfaces), sandstone
- 2 thick bifaces, broken, heat-treated, white chert
- 1 thick biface, broken, banded gray-white chert
- 1 secondary element, banded gray-white chert
- 1 thin biface, mottled brown-gray chert
- 1 thin biface, gray chert

Bag #3

- 3 fire-cracked rock
- 2 cores, banded gray-white chert
- 1 core, mottled white chert
- 1 core, gray chert
- 1 unifacial scraper (one edge) steeply retouched uniface (two edges), white chert
- 2 steeply retouched unifaces, gray chert
- 1 steeply retouched uniface, banded gray-white chert
- 1 arrowpoint preform (crisp ovate), banded gray-white chert (heat treated)
- 1 primary element, red chert
- 2 primary elements, banded gray-white chert
- 3 secondary elements, red chert
- 1 secondary element, gray chert
- 6 secondary elements, white chert
- 1 secondary element, blue-gray chert
- 4 secondary elements, banded gray-white chert
- 1 secondary element, gray chert
- 1 arrowpoint mid-section, unifacial, gray chert
- 2 tertiary elements, gray chert
- 1 tertiary element, tan chert
- 11 tertiary elements, banded gray-white chert
- 8 tertiary elements, white chert
- 7 tertiary elements, mottled white chert
- 1 tertiary element, pink chert

Bag #4

- 15 fire-cracked rocks
- 1 pitted cobble, sandstone
- 3 cores, banded gray-white chert
- 1 core, gray chert
- 1 core, tan-black chert
- 1 drill/perforator, gray chert
- 1 projectile point/hafted cutting tool, banded gray-white chert
- 5 steeply retouched unifaces: 3 on white chert, 1 on banded gray-white chert, and 1 on gray-black chert
- 1 unifacial scraper, mottled white chert

- 1 unifacial scraper, white-black chert
- 3 secondary elements, pink chert
- 2 secondary elements, gray chert
- 1 primary element, banded gray-white chert
- 2 secondary elements, mottled white chert
- 12 secondary elements, banded gray-white
- 4 tertiary elements, pink chert
- 6 tertiary elements, gray chert
- 4 tertiary elements, mottled white chert
- 15 tertiary elements, white chert
- 3 tertiary elements, gray-black chert
- 11 tertiary elements, banded gray-white chert

23CE235: SURFACE COLLECTIONS, SEPTEMBER 1981

- 1 fire-cracked rock
- 8 cores, gray-white banded chert
- 1 core, gray chert
- 1 core, banded gray-black chert
- 4 cores, white chert
- 3 cores, red-pink chert
- 2 pitted stones, sandstone
- 4 projectile points/hafted cutting tools, banded gray-white chert
- 1 perforator, white chert
- 1 thick biface, pink quartzite
- 1 steeply retouched uniface, tan chert (1 edge)
- 1 steeply retouched uniface; gray-black chert (2 working edges)
- 3 steeply retouched unifaces, gray chert
- 3 steeply retouched unifaces, translucent gray chert
- 3 unifacial scrapers, banded gray-white chert
- 4 steeply retouched unifaces, banded gray-white chert
- 1 spokeshave, white chert
- 1 graver (broken), white chert
- 7 steeply retouched unifaces, white chert
- 1 unifacial scraper, white chert
- 3 secondary elements, blue-gray banded chert
- 2 secondary elements, gray quartzite
- 5 secondary elements, tan chert
- 1 secondary element, gray-black chert
- 2 secondary elements, gray chert
- 21 secondary elements, red-pink chert
- 2 primary elements, red-pink chert
- 25 secondary elements, banded gray-white chert
- 18 secondary elements, white chert
- 3 primary elements, white chert
- 4 tertiary elements, gray-black chert
- 2 tertiary elements, black chert
- 1 tertiary element, tan chert
- 10 tertiary elements, gray chert
- 4 tertiary elements, pink chert
- 11 tertiary elements, mottled gray-white chert
- 38 tertiary elements, banded gray-white chert
- 58 tertiary elements, white chert
- 1 bifacial thinning element, white chert

23CE235: Test Units

Test Unit 1, 0-10 cm below surface
1 hematite fragment

Test Unit 1, 10-20 cm below surface
sterile

Test Unit 1, 20-30 cm below surface
sterile

Test Unit 2, 0-10 cm below surface

- 2 fire-cracked rock
- 1 projectile point/hafted cutting tool, white chert
- 1 secondary element, white chert
- 1 secondary element, gray chert
- 2 tertiary elements, white chert
- 3 tertiary elements, banded gray-white chert
- 2 tertiary elements, pink chert
- 4 tertiary elements, gray chert
- 2 steeply retouched unifaces, 1 tan chert, 1 white chert

Test Unit 2, 10-20 cm below surface

- 1 fire-cracked rock
- 2 secondary elements, banded gray-white chert
- 4 tertiary elements, banded gray-white chert
- 2 tertiary elements, gray chert
- 1 tertiary element, red chert
- 3 tertiary elements, white chert
- 2 steeply retouched unifaces, 1 gray chert, 1 banded gray-white chert

Test Unit 2, 20-30 cm below surface

- 1 secondary element, white chert
- 2 tertiary elements, white chert

Test Unit 3, 0-10 cm below surface

- 1 thin biface, gray chert, broken
- 1 secondary element, mottled white chert
- 1 tertiary element, mottled white chert
- 3 tertiary elements, banded gray-white chert

Test Unit 3, 10-20 cm below surface

- 1 fire-cracked rock
- 1 thick biface, white chert, broken
- 3 secondary elements, chert
- 2 tertiary elements, red chert
- 6 tertiary elements, banded gray-white chert
- 9 tertiary elements, gray chert
- 11 tertiary elements, white chert

Test Unit 3, 20-30 cm below surface

- 2 secondary elements, white chert
- 1 secondary element, pink chert
- 6 tertiary elements, pink chert
- 3 tertiary elements, banded gray-white chert
- 1 unifacial scraper, white chert

Test Unit 4, 0-10 cm below surface

- 1 tertiary element, white chert

Test Unit 4, 10-20 cm below surface

- 2 tertiary elements, banded gray-white chert

Test Unit 4, 20-30 cm below surface
1 tertiary element, pink chert
1 secondary element, white chert

Site 23CE252

23CE252: GENERAL SURFACE COLLECTION

- 1 steeply retouched uniface, tan chert
- 1 thick biface, broken, mottled white chert (heat-treated)
- 1 thin biface, broken, banded gray-white chert
- 1 thin biface, broken, white chert (heat-treated)
- 1 projectile point/hafted cutting tool, midsection, mottled white chert
- 1 projectile point/hafted cutting tool, base, banded gray-white chert
- 2 tertiary elements, 1 banded gray-white chert, 1 gray chert
- 1 secondary element, tan chert
- 1 secondary element, blue-gray chert
- 2 secondary elements, banded gray-white chert
- 2 cores, banded gray-white chert
- 1 core, tan chert
- 1 core, gray chert

23CE252: Shovel Tests

Transect 1, Shovel Test 1

- 1 tertiary element, white chert

Transect 1, Shovel Test 5

- 1 core, banded gray-white chert
- 1 secondary element, heat treated white chert
- 2 tertiary elements, banded gray white chert
- 1 tertiary element, mottled brown-gray chert

Transect 1, Shovel Test 6

- 1 secondary element, banded gray-white chert
- 1 tertiary element, banded gray-white chert

Transect 1, Shovel Test 8

- 1 split cobble, banded gray-white chert
- 2 secondary elements, banded gray-white chert
- 2 tertiary elements, 1 banded chert, 1 heat treated white chert
- 1 bifacial thinning flake, white chert

Transect 2, Shovel Test 4

- 1 core, river cobble, brown-gray chert
- 3 secondary elements, 1 banded gray-white chert, 1 tan chert, 1 pink chert
- 2 tertiary elements, 1 banded gray-white chert, 1 white chert

Transect 2, Shovel Test 5

- 1 tertiary element, white quartzite
- 3 tertiary elements, white chert
- 1 tertiary element, gray chert
- 2 core fragments, 1 white chert, 1 red chert (coarse grained)

Transect 2, Shovel Test 6

1 secondary element, mottled white chert

Transect 2, Shovel Test 7

1 tertiary element, gray chert

Transect 2, Shovel Test 8

2 secondary elements, banded gray-white chert

1 tertiary element, gray chert

Transect 3, Shovel Test 4

1 tertiary element, banded gray-white chert

Transect 3, Shovel Test 5

1 tertiary element, banded gray-white chert

Transect 3, Shovel Test 7

1 steeply retouched uniface, banded gray-white chert

Transect 5, Shovel Test 6

1 tertiary element, gray chert

23CE252: Test Units

Test Unit 1, 0-10 cm below surface

2 cobble fragments, chert, unburnt

3 fire-cracked rocks

2 primary elements, mottled white chert

1 primary element, pink chert

1 secondary element, banded gray-white chert, unifacial use-wear

4 secondary elements, banded chert

3 secondary elements, red chert

6 secondary elements, red-yellow chert (coarse-grained)

1 secondary element, quartzite

5 secondary elements, gray chert

5 secondary elements, white chert

1 tertiary element, quartzite

9 tertiary elements, gray chert

10 tertiary elements, red chert

18 tertiary elements, banded gray-white chert

22 tertiary elements, white chert

6 tertiary elements, mottled gray-white chert

6 tertiary elements, red-yellow chert

4 steeply retouched unifaces, 3 tertiary elements, 1 secondary element

1 arrowpoint basal fragment, red chert

Test Unit 1, 10-20 cm below surface

2 cobble fragments, chert, unburnt

1 fire-cracked rock

2 cores, banded gray-white chert

1 primary element, red quartzite

- 3 secondary elements, white chert
- 3 secondary elements, gray chert
- 7 secondary elements, banded gray-white chert
- 1 secondary element, red-yellow chert
- 1 biface thinning element, banded chert
- 2 tertiary elements, translucent gray chert
- 1 tertiary element, yellow-red chert
- 7 tertiary elements, red-pink chert
- 2 tertiary elements, gray-black coarse-grained chert
- 6 tertiary elements, white chert
- 5 tertiary elements, gray chert
- 2 tertiary elements, mottled gray-white chert
- 26 tertiary elements, banded gray-white chert
- 1 steeply retouched uniface, banded gray-white chert, tertiary element

Test Unit 2, 0-10 cm below surface

- 1 primary element, white chert
- 2 secondary elements, banded gray-white chert
- 3 tertiary elements, translucent pink chert
- 2 tertiary elements, mottled gray-white chert
- 4 tertiary elements, banded gray-white chert
- 5 tertiary elements, red-pink chert

Test Unit 2, 10-22 cm below surface

- 1 core, banded gray-white chert
- 2 secondary elements, banded gray-white chert
- 1 secondary element, mottled gray-white chert
- 1 secondary element, steeply retouched uniface, banded gray-white chert
- 2 tertiary elements, pink chert
- 2 tertiary elements, gray chert
- 5 tertiary elements, banded gray-white chert
- 5 tertiary elements, white chert
- 1 scraper bit, broken, white chert

Test Unit 3, 0-10 cm below surface

- 1 core, white chert (heat treated)
- 2 secondary elements, banded gray-white chert
- 2 secondary elements, pink-red chert
- 1 secondary element, mottled gray-white chert
- 3 secondary elements, white chert
- 1 spokeshave, white chert
- 1 bifacial thinning element, banded gray-white chert
- 6 tertiary elements, banded gray-white chert
- 2 tertiary elements, mottled gray-white chert
- 3 tertiary elements, red-pink chert
- 3 tertiary elements, white chert

Test Unit 3, 10-22 below surface

- 1 fire-cracked rock
- 2 split cobbles, banded gray-white chert
- 1 primary element, white chert

- 4 secondary elements, mottled gray-white chert
- 1 biface thinning flake, pink chert
- 1 biface thinning flake, white chert
- 1 secondary element, gray chert
- 9 secondary elements, banded gray-white chert
- 3 secondary elements, white chert
- 6 tertiary elements, mottled gray-white chert
- 1 tertiary element, yellow-red chert
- 1 tertiary element, white translucent chert
- 3 tertiary elements, pink chert
- 5 tertiary elements, white chert
- 9 tertiary elements, banded gray-white chert

Test Unit 4, 0-10 cm below surface

- 1 primary element, tan chert, unifacial use-wear
- 1 primary element, red chert
- 3 secondary element, gray chert
- 1 secondary element, tan chert
- 1 secondary element, pink chert
- 7 secondary elements, banded gray-white chert (2 are heat-treated)
- 5 tertiary elements, pink-red chert
- 3 tertiary elements, tan-yellow chert
- 1 tertiary element, mottled gray-white chert
- 11 tertiary elements, white chert
- 7 tertiary elements, gray chert
- 21 tertiary elements, banded gray-white chert

Test Unit 4, 10-20 cm below surface

- 2 split and fractured cobbles, banded chert
- 2 secondary elements, banded gray-white chert
- 1 secondary element, tan chert
- 1 tertiary element, blue-gray chert (Choteau chert)
- 2 tertiary elements, gray chert
- 5 tertiary elements, banded gray-white chert
- 3 tertiary elements, pin-red chert
- 7 tertiary elements, white chert
- 1 bifacial thinning element, banded gray-white chert

Test Unit 5, 0-10 cm below surface

- 2 steeply retouched unifaces, banded gray-white chert
- 3 fire-cracked rock
- 6 secondary elements, banded gray-white chert
- 1 secondary element, mottled gray-white chert
- 2 secondary elements, white chert
- 1 secondary element, pink-red chert
- 4 tertiary elements, pink chert
- 2 tertiary elements, mottled gray-white chert
- 1 tertiary element, mottled white chert
- 4 tertiary elements, gray chert
- 12 tertiary elements, white chert
- 21 tertiary elements, banded gray-white chert

Test Unit 5, 10-20 cm below surface

- 1 ground cobble, sandstone
- 1 split cobble, gray chert
- 3 fire-cracked rock
- 3 secondary elements, pink-red chert (red cortex)
- 2 secondary elements, white chert (weathered white cortex)
- 3 secondary elements, banded gray-white chert
- 2 secondary elements, mottled gray-white chert
- 2 tertiary elements, blue-gray chert
- 2 tertiary elements, gray chert
- 2 tertiary elements, mottled gray-white chert
- 3 tertiary elements, pink chert
- 3 tertiary elements, white chert
- 3 tertiary elements, mottled white chert
- 5 tertiary elements, tan chert
- 14 tertiary elements, banded gray-white chert

Test Unit 6, 0-10 cm below the surface

- 1 clear bottle glass
- 1 unifacial scraper, mottled gray-white chert
- 1 split and cracked cobble, banded gray-white chert
- 1 secondary element, pink chert (coarse-grained)
- 2 secondary elements, white chert
- 4 secondary elements, white chert
- 4 secondary elements, banded gray-white chert
- 1 secondary element, tan chert
- 5 tertiary elements, mottled white chert
- 10 tertiary elements, pink chert
- 2 tertiary elements, tan chert
- 1 tertiary element, mottled gray-white chert
- 3 tertiary elements, gray chert
- 10 tertiary elements, white chert
- 12 tertiary elements, banded gray-white chert
- 1 bifacial thinning element, banded gray-white chert
- 1 steeply retouched uniface, banded gray-white chert

Test Unit 6, 10-20 cm below surface

- 1 pitted cobble, sandstone
- 2 clear bottle glass
- 1 uniface, mottled white chert
- 1 projectile point/hafted cutting tool, white chert (broken)
- 1 arrowpoint, mottled gray-white chert
- 5 secondary elements, banded gray-white chert
- 2 secondary elements, pink-red chert
- 1 secondary element, blue-gray chert
- 1 secondary element, white chert
- 9 tertiary elements, pink chert
- 5 tertiary elements, gray chert
- 2 tertiary elements, mottled gray-white chert
- 14 tertiary elements, white chert
- 5 tertiary elements, mottled white chert
- 9 tertiary elements, banded gray-white chert

Test Unit 6, 20-25 cm below surface

- 1 secondary element, red chert
- 1 secondary element, gray chert
- 2 tertiary elements, pink chert
- 1 tertiary element, mottled gray-white chert
- 1 tertiary element, gray chert
- 1 tertiary element, tan chert
- 5 tertiary elements, white chert
- 8 tertiary elements, banded gray-white chert

Test Unit 7, 0-10 cm below surface

- 1 core, banded gray-white chert
- 1 primary element, white chert
- 1 secondary element, white chert
- 1 tertiary element, mottled white chert
- 7 tertiary elements, banded gray-white chert
- 2 tertiary elements, pink-red chert
- 1 tertiary element, gray chert
- 2 tertiary elements, white chert

Test Unit 7, 10-21 cm below surface

- 1 blue bottle glass
- 1 steeply retouched uniface, mottled white chert (heat-treated)
- 1 secondary element, banded gray-white chert
- 4 tertiary elements, banded gray-white chert
- 2 tertiary elements, mottled white chert
- 7 tertiary elements, white chert

Test Unit 8, 0-10 cm below surface

- 1 core, banded gray-white chert (tan cortex)
- 1 fire-cracked rock
- 1 primary element, banded gray-white chert
- 1 secondary element, white quartzite
- 1 secondary element, white chert
- 1 secondary element, red chert
- 1 secondary element, tan chert (brown cortex)
- 2 secondary elements, banded gray-white chert
- 6 tertiary elements, pink chert
- 5 tertiary elements, gray chert
- 5 tertiary elements, mottled white chert
- 1 tertiary element, tan chert
- 12 tertiary elements, white chert
- 20 tertiary elements, banded gray-white chert

Test Unit 8, 10-23 cm below surface

- 1 core, tan chert
- 1 thick biface, mottled white chert (heat treated), broken
- 1 primary element, banded chert
- 1 steeply retouched uniface, primary element, banded grey-white chert
- 3 secondary elements, white chert
- 1 secondary element, red chert

- 1 secondary element, tan chert
- 2 secondary elements, translucent gray chert
- 11 secondary elements banded gray-white chert
- 9 tertiary elements, pink chert
- 13 tertiary elements, white chert
- 1 tertiary element, tan chert
- 1 tertiary element, blue-gray chert
- 1 tertiary element, blue-gray chert
- 4 tertiary elements, mottled white chert
- 23 tertiary elements, banded gray-white chert
- 1 steeply retouched uniface, tertiary element, banded gray-white chert

Site 23CE324

23CE324: GENERAL SURFACE COLLECTION

- 2 projectile point/hafted cutting tools, mottled white chert
- 2 projectile points/hafted cutting tools, white chert
- 1 steep unifacial scraper, banded gray-white chert
- 1 core, mottled white chert
- 2 cores, banded gray-white chert
- 4 fire-cracked rock
- 1 secondary element, white chert
- 2 secondary elements, banded gray-white chert
- 5 tertiary elements, banded gray-white chert
- 1 tertiary element, mottled gray chert
- 2 tertiary elements, white chert
- 1 bifacial thinning element, banded gray-white chert
- 1 mortar, sandstone

23CE324: TRANSECT SURFACE COLLECTIONS

Transect 1

- 1 core, white chert
- 1 steeply retouched uniface, banded gray-white chert
- 4 tertiary elements, white chert
- 1 tertiary element, mottled gray-white chert
- 3 fire-cracked rocks

Transect 2

- 1 tertiary element, white chert
- 3 tertiary elements, banded gray-white chert
- 1 tertiary element, gray chert

Transect 3

- 1 projectile point/hafted cutting tool, banded gray-white chert
- 1 steeply retouched uniface, white chert
- 1 tertiary element, white chert
- 1 tertiary element, banded gray-white chert
- 1 secondary element, pink chert
- 1 secondary element, white chert

Transect 4

- 1 pitted cobble, sandstone
- 1 arrowpoint, white chert
- 1 secondary element, banded gray-white chert
- 1 tertiary element, banded gray-white chert

Transect 5

- 3 fire-cracked rock
- 2 tertiary elements, mottled white chert
- 3 tertiary elements, banded gray-white chert
- 1 secondary element, banded gray-white chert

23CE324: TEST UNITS

Test Unit 1, 0-10 cm below surface

2 tertiary elements, white chert

Test Unit 1, 10-20 cm below surface

2 tertiary elements, 1 white chert, 1 gray-black chert

Test Unit 1, 20-30 cm below surface

sterile-no cultural material

Test Unit 1, 30-40 cm below surface

1 tertiary element, mottled white chert

1 tertiary element, white chert

Test Unit 2, 0-10 cm below surface

1 secondary element, gray chert

1 secondary element, pink chert

Test Unit 2, 10-20 below surface

2 brown bottle glass

Test Unit 2, 20-30 cm below surface

sterile-no cultural material

Test Unit 3, 0-10 cm below surface

sterile-no cultural material

Test Unit 3, 10-20 cm below surface

1 wire nail

1 secondary element, banded gray-white chert

1 core, banded gray-white chert

Test Unit 3, 20-30 cm below surface

1 secondary element, white chert

1 tertiary element, mottled white chert

Test Unit 4, 0-10 cm below surface

3 fire-cracked rocks

1 core, banded gray-white chert

1 tertiary element, white chert

1 tertiary element, pink chert

1 tertiary element, banded gray-white chert

1 steeply retouched uniface, white chert

Test Unit 4, 10-20 cm below surface

3 tertiary elements, gray chert

1 tertiary element, banded gray-white chert

1 tertiary element, mottled white chert

Test Unit 5, 0-10 cm below surface

sterile-no cultural material

Positive Shovel Test

1 tertiary element, pink chert

AREA B, BANK PROFILE, SURFACE COLLECTION

1 thin biface, banded, gray-white chert

2 split cobbles, 1 white chert, 1 banded gray-white chert

AREA C, GENERAL SURFACE COLLECTION

2 secondary elements, banded gray-white chert

1 pitted cobble, sandstone

1 hammerstone, banded gray-white chert

1 fire-cracked rock

APPENDIX II

Glossary of Technical Terms

GLOSSARY OF TECHNICAL TERMS

alfisols	Mineral soils with an argillic horizon, i.e. one on which clays have accumulated in the B-horizon to a significant extent by illuviation.
aggradation	The deposition of sediments, etc. raising the level of the floodplain surface.
aggregate	A collection of cultural manifestations from a given spatial context--or the sum total of materials occurring on a site. The term is used when discussing finds that are not assuredly associated (Wood 1961:5).
A-horizon	A mineral horizon consisting of (a) near surface organic matter accumulations and (b) horizons that have lost certain minerals and are now dominated by sands and silts.
assemblage	The distinct combination of stylistic, functional, and technological artifact classes present at a site and/or groups of contemporaneous sites.
base camp	A multi-seasonal residential location where food procurement, preparation, and storage activities were carried out. Structures, pits, and other features are commonly found at these locations.
B-horizon	Horizons featuring (1) an illuvial concentration of clays etc., and/or (2) a residual concentration of silicate clays (USDA 1975:460).
broadcast burial	Burials where individual elements of the skeleton are tossed and purposefully mixed with other scattered burials in cairn mound fill.
burial program	The rules for disposal of the dead within a society. These include treatment of the body, preparation of the disposal facility, burial context within a grave, and population profile.
cairn	Small circular to rectangular mounds of limestone placed over burials laid on exposed bedrock or set within burial chambers.
chi-square analysis (χ^2)	The comparison of experimentally observed values with the theoretically expected (non-parametric). Probability distributions using the chi-square statistic.
closed canopy	A forest where the trees grow close together and consequently shade the greater part of the ground surface.

complex	A series of assemblages which might be defined as a focus or phase, but uncertainty exists as to their association (Wood 1961:5).
conchoidal ripple	Small rippling patterns in percussion and pressure flake scars (Rick 1978:51).
contingency table	The bivariate (i.e. consideration of multiple dimensions) form of chi-square analysis.
crinoid	A fossil marine animal commonly occurring in certain types of bedrock limestone and chert formations.
curate	The activity whereby items are stored for use and reuse and not always carried between such locations, because of size, weight, and/or other functional parameters.
data recovery program	The program that ensures the recovery and description of the complete range of archaeologically observable activities and culturally relevant environmental data at sites, and their relationship to research problems that take into account the known and expected research values of a site.
degrees of freedom (df)	The number of classes within a chi-square table. It is determined by the number of independent observed-expected comparisons.
ecofact	Faunal and floral material recovered in archaeological context.
econiche	The variety of food resources utilized by the consumer as characterized by differences in spatial distribution, size, abundance, etc.
ecotone	Transition zones between major ecosystems; i.e. between woodlands and prairies, often a region of increasing variety and density of plant and animal life.
edge effect	The tendency for increased variety and density of plant and animal life at community junctions.
extended primary	Burial position where the legs of the skeleton are straight, joining the trunk of the body at an angle of 180 degrees.
factor	A set of variables derived from the multivariate statistical technique of factor analysis. The factors are composed of a series of interrelated variables that account for all or most of the variation in a particular data correlation.

flexed	Burial position where the angle between the axis of the trunk and the femur is less than 90 degrees.
formation	A body of rocks classified as a unit for geological mapping.
GLO	General Land Office Federal Land survey data.
habitat	A spatial-temporal mosaic of different elements of organisms (plant and animal foods) and other resources.
Holocene	Post-Pleistocene (or glacial) geological unit dating from ca. 11,000 B.P.
Hypsithermal	A period of reduced annual precipitation and/or warmer temperatures in the Holocene, 8300-5300 B.P.
Inceptisols	Mineral soils of humid areas that do not have an illuvial horizon of clay but a fragipan.
interval scale	The categorization of data by rank with the distances between categories equal and specifiable.
Mean	The average in a series of variable measurements, i.e. $\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{N}$ where X_1 is one measurement and N is the sample size and \bar{X} is the mean.
meander loop	That portion of the channel resulting from lateral migration or meandering of a stream.
Mesic	An adaptation to an environment having a balanced supply of moisture.
nominal scale	The categorization of data that are exhaustive and mutually exclusive (items are classified into only one category).
oolite	An oolite is a small object made out of calcium carbonate that commonly occurs in limestone and/or chert bedrock.
Ordovician age	A geological period dating between 475-425 million years ago in the Paleozoic era.
Pennsylvanian age	A geological period dating between 310-265 million years ago in the Paleozoic era.
physiographic subarea	Regions that can be divided on the basis of surface features, drainage, soils, minerals, vegetation, etc.

population (p)	The set of all possible relevant observations about a class of objects, etc.
procurement	The acquisition of energy and/or raw materials as part of an adaptive strategy.
radiation-offset	The establishment of a baseline or parallel line with the location of objects off that line done by utilizing right angles from the baseline.
rocker-stamped	A ceramic decorative technique where a stamp is rocked across the surface of the ceramic vessel to make a design pattern.
Rodgers alluvium	A clayey silt alluvial deposit representing phases of aggradation from 10,500-1700 B.P. in the Sac and Pomme de Terre River basins (Brackenridge 1981).
sample	The set of observations about the population actually chosen for statistical manipulations.
settlement system	The distribution of prehistoric groups across the landscape, and the nature of the different activities conducted at particular locations.
silt loam	Soil material that contains 50% or more silt and 12 to 27% clay (or) 50 to 80% silt and less than 12% clay (USDA 1975:470).
site catchment	The consideration of resources within a demarcated area surrounding a site.
soil association	A landscape that has a distinct proportional pattern of soils, consisting of one or more major soil types.
standard deviation	The square root of the variance, where the variance is the average deviation of each measurement from the mean.
stylistic attributes	Those attributes that relate directly to chronological and spatial factors, i.e. ceramic design motifs, projectile point forms.
tillage processes	The mechanical manipulation of soil conditions for crop production (Lewarch and O'Brien 1981).
transect	Parallel lines and/or lines (azimuths) of different angles cutting across landforms, etc.
triangulation	A method of location utilizing 2 or more datum points to pinpoint object distances by the intersection of angles from the datum points to the object.

ultisols

Mineral soils that contain appreciable amounts of translocated clays in the B-horizon; generally present in areas that are humid and have seasonal precipitation.

APPENDIX III

Test Excavations at Sites 23CE240 and 23CE241, Cedar County, Missouri

by

Burton L. Purrington

APPENDIX III

TEST EXCAVATIONS AT SITES 23CE240 AND 23CE241, CEDAR COUNTY, MISSOURI

INTRODUCTION

This appendix to the report describes the test excavation of 2 additional sites included in the U.S. Army Corps of Engineers Purchase Order DACW41-77-M-1569. As is noted above in the main body of the report, when the scope of work for this project was originally issued by the Kansas City District in 1977, it encompassed the testing of five prehistoric archaeological sites, 23CE235, 23CE240, 23CE241, 23CE242, and 23CE252 (Figure 4). By early 1981 the Kansas City District had been able to secure rights-of-entry for only sites 23CE235 and 23CE252, and in March, 1981, the scope of work was amended to include work on these two sites with the provision that should rights-of-entry be secured for any of the remaining sites before the purchase order was complete, work would be performed on those sites too.

On February 18, 1982, the Corps of Engineers determined that site 23CE242 would not be impacted by the planned construction, and, therefore, further investigation and assessment of the significance of the site were not necessary at this time.

On August 5, 1982, rights-of-entry were secured for the remaining sites, 23CE240 and 23CE241, which will be severely impacted by channel construction at 23CE240 and grading and filling at 23CE241. Test excavations began on September 29, 1982, and were conducted intermittently until November 16, 1982. There were several lengthy delays in field work due to heavy rains and slow drainage at the sites. The excavations were directed by Burton Purrington, Research Archaeologist, and Carolyn "Jeep" Helm, Research Associate, of the Center for Archaeological Research, Southwest Missouri State University. The field crew consisted of Betty Jane Turner, Research Associate, and Ramsey Bearden, Patsy Corbett, David Massey, and Rike Reuter-Hart, Research Technicians. The landowners, J.C. and Sheila Eslinger, were very accommodating and helpful. They assisted us with shovel testing and excavation and provided us with extremely useful information about the sites.

BACKGROUND AND RESEARCH OBJECTIVES

The background and research objectives pertinent to the investigation of 23CE240 and 23CE241 are presented in Chapters II - V of this report. The sites were recorded in 1976 by the Division of American Archaeology, University of Missouri, during a survey of the Sac River Valley below Stockton Dam, and the following information in this paragraph is taken from the report of that survey (Roper 1977). The sites were discovered at the neck of a sharp meander of the Sac River (Figure 40) under conditions of relatively good surface visibility (0-10% ground cover) in a plowed field which had been recently rained upon. The estimated extent of the sites was 7,500 m² for 23CE240 and 1,000 m² for 23CE241. Twenty-six cultural items including a corner-notched point with long barbs were found at 23CE240, and 76 cultural items including a Scallorn point and a mano were found at 23CE241 (Table 28). The two points from these sites are not described or identified in illustrations in Roper's report. The barbed,



Figure 40. Topographic setting of sites 23CE240 and 23CE241, Sac River Valley, Cedar County, Missouri

Table 28

Artifacts from surface of 23CE240 and 23CE241, collected during 1976 survey (after Roper 1977:Tables 5 and 8)

	Corner notched, Long barb	Scallorn	Biface - class 5 ovoid	Biface - class 6 Pointed end segment	Biface - class 12 Midsection	Retouched and/ or utilized flakes	Shatter	Secondary Flakes	Tertiary Flakes	Mano	Total
23CE240	1	-	-	-	-	3	8	1	13	-	26
23CE241	-	1	1	2	1	-	17	13	40	1	76

corner-notched point from 23CE240 may represent a Late Archaic or Woodland occupation whereas the Scallorn point from 23CE241 probably represents a Late Woodland or Mississippian period occupation. The sites were functionally classified as limited activity sites (Roper 1977:96, 104).

Roper recommended that further investigations be conducted at 23CE240 and 23CE241 to mitigate the impact of proposed construction by the Corps of Engineers. She noted that understanding the function of limited activity sites is important to understanding the nature of prehistoric settlement systems, and since "so few of these sites have been investigated . . . the information potential is high" (Roper 1977:104). Roper suggested that further investigations at the sites need not be extensive; "adequate mitigation might consist of a controlled intensive surface collection coupled with limited excavation to check for depth and subsurface features" (Roper 1977:104). Following Roper's recommendations the Corps of Engineers specified that investigations at each site include controlled intensive surface collections and excavation of a total of 8 m². (See scope of work, Appendix I).

Research objectives for this project are discussed in Chapter V of this report. To summarize, the primary objective of the study is to gather sufficient data to make a determination of the eligibility or ineligibility of the sites for inclusion in the National Register of Historic Places. The project data recovery plan pertains to: 1) the structure, content, and integrity of the archaeological sites, and 2) the development of several research problems relevant to regional concerns and pertinent to the data to be recovered. Relevant research problems include: 1) location and settlement choice, 2) nature of the lithic assemblage including functional and technological considerations, and 3) intrasite patterns.

LOCATION AND DESCRIPTION OF SITES

Sites 23CE240 and 23CE241 are located in the floodplain of the middle course of the Sac River in the Springfield Plain subdivision of the Ozark physiographic province. In the Missouri Historic Preservation Program's system of hydrological units, the sites are in the Sac River watershed of the Osage River principal drainage basin and the Missouri River major drainage basin. They are located in the neck of a meander of the Sac River called Horseshoe Bend. The length of the meander at Horseshoe Bend is about 3.8 km, but the width of the narrow neck where 23CE240 and 23CE241 are located is only about 100 m. There are several abandoned channels of the Sac River about 300 m to 500 m west of the sites (Figure 40), and it appears that the river has been migrating to the east in recent millennia. No cultural material was found eroding from the river banks which suggests that neither site is presently being undercut by the Sac River, and it appears that their boundaries are essentially intact. The Sac River Valley is only about 1.0-1.3 km wide at this point, and the distance of the sites from the river at the time they were prehistorically occupied was probably no more than 200 m, and perhaps much less.

The general character of the topography in this portion of the Sac River floodplain is rolling because of the presence of many former channels and cutoffs of the Sac River. The land surface on which the sites are located is gently rolling. The soils at this location are alluvial and this landform appears to roughly correspond with the T-0 terrace identified in the lower Pomme de Terre Valley (Haynes 1976:58). The soils at the sites

appear to have been in place for a sufficiently long period of time for an incipient textural B-horizon to have formed. These alluvial soils are rather dark and may reflect a past prairie bottomland environment. The modern land surface at this location is only about 3-4 m above the Sac River.

METHODS AND RESULTS

The sites are located in a cultivated field in the floodplain of the Sac River. The field had been plowed and disked just prior to testing, and surface visibility was 100% except for 2 small areas where brush had been piled. Prior to laying out the sampling units a surface reconnaissance was conducted to determine site boundaries and identify artifact concentrations if possible. However, the upper few inches of soil were very dry, and no cultural material was visible on the surface except along a field road on the south end of the field where the landowner said he had previously discarded lithic debris after collecting it in the field (Figure 41). A half-dozen chert flakes were collected along this road.

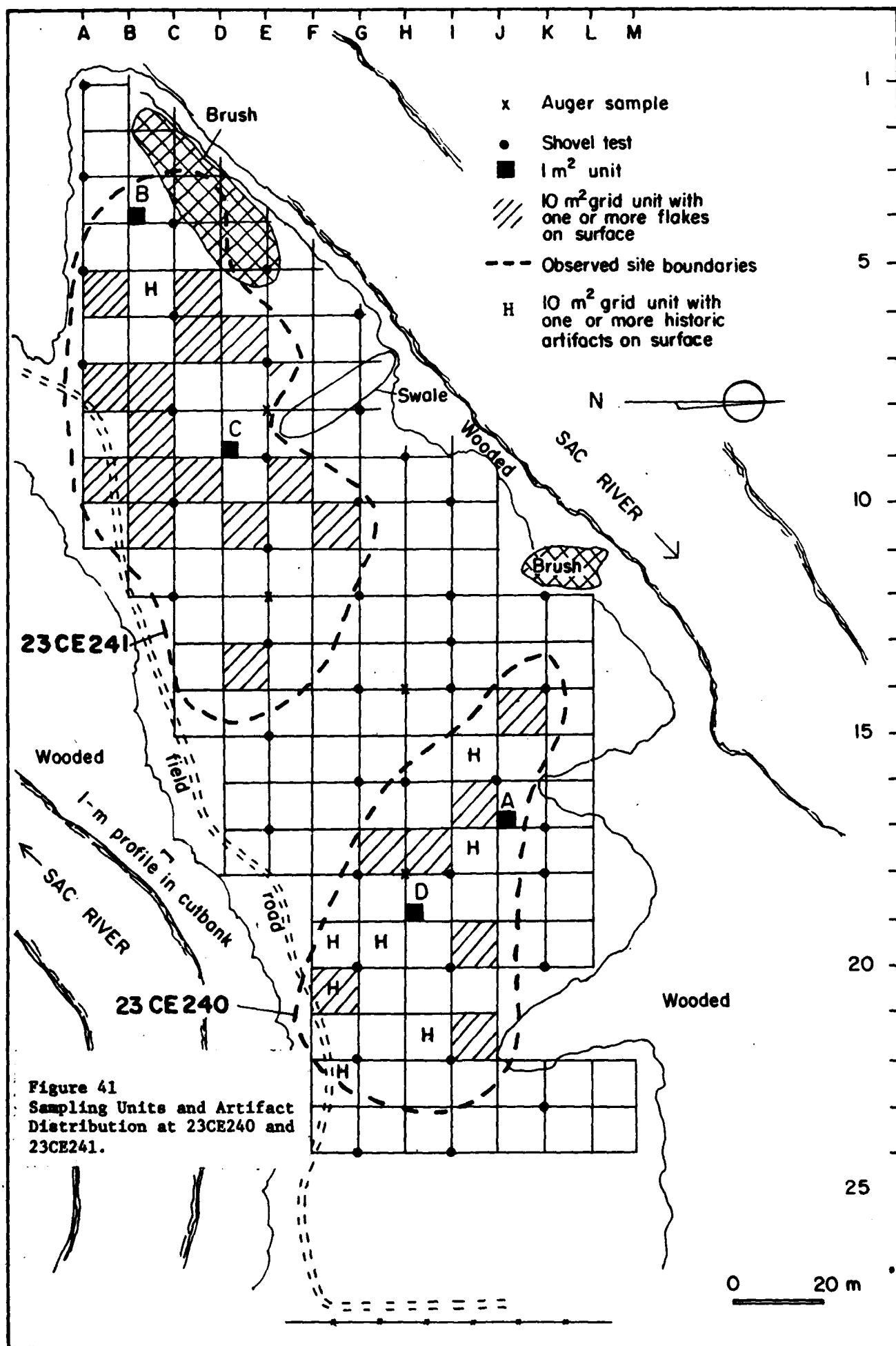
Since the boundaries of the sites could not be determined at this time by surface investigation, a grid of 10-meter squares was laid out across the entire field using a Brunton compass and a 50-meter tape. Shovel tests measuring approximately 30 cm in diameter and 30 cm deep were excavated at 20 m intervals across the field (Figure 41). Four screw auger samples were taken in 10 cm increments to depths of 140-160 cm below surface in the areas where the previous survey had recovered cultural material. All shovel tests and auger samples were negative.

Two one-meter square test units were excavated in 10 cm levels in each of the areas where the previous survey showed a site to be located (Figure 41). A plowzone 15-25 cm in depth was revealed. Unit A at site 23CE240 yielded 4 flakes from depths of 40-50 cm, 60-70 cm, and 80-90 cm below surface respectively. The unit was excavated to a depth of 150 cm below surface and a screw auger sample was taken in 10 cm increments to a depth of 245 cm below surface (Figure 42). No additional cultural material was found and there were no features or changes in the soil that would suggest human activity. Unit D at this site was excavated to a depth of 60 cm below surface and no archaeological remains were found.

Units B and C at site 23CE241 were excavated to a depth of 60 cm below surface, and a screw auger sample was taken in 10 cm increments to a depth of 160 cm below surface in Unit B. With the exception of a probable post mold in Unit B, which is very dark and presumably historic (Figure 43), no cultural materials, features, or midden zones were found in these units.

After a 6-week delay due to heavy rains at the site, the crew returned. The soil was still too wet for excavation, but a small amount of cultural material was visible on the surface. Using a grid of 10-meter squares, a controlled surface collection was conducted over the entire field. Only 44 pieces of lithic debris were found, and it is very difficult even under these ideal conditions to determine site boundaries. However, there is an area about 30 meters wide which lies in the approximate area shown on the Corps of Engineers maps as being between the two sites where no cultural material was found (Figure 41).

A profile 1 meter wide and nearly 2 meters deep was excavated in the riverbank on the south end of the field. The profile showed weakly developed A and B horizons in silty alluvium like the profile in Unit A (Figure 42). No cultural materials, features, or midden zones were found.



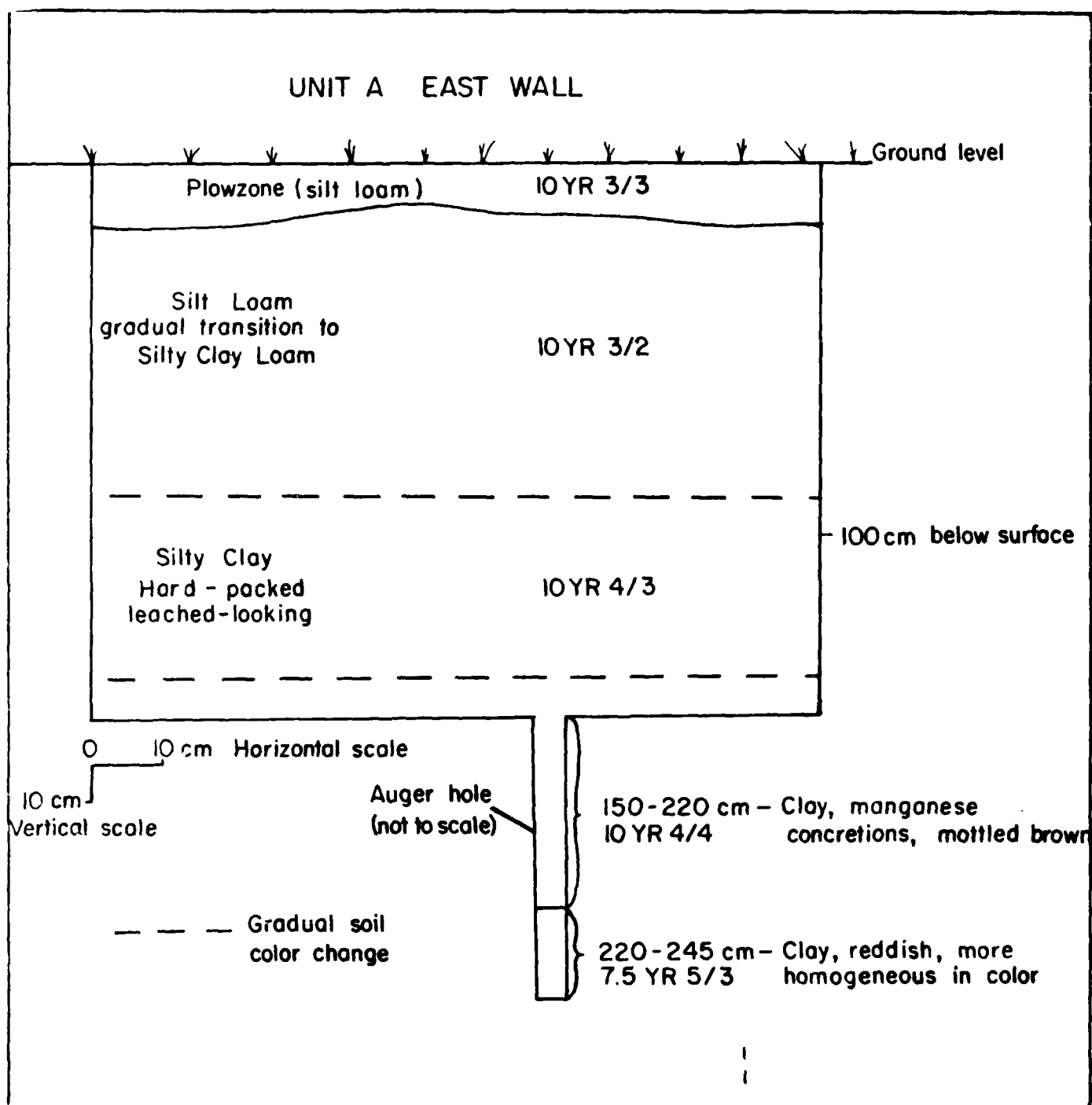


Figure 42. Profile of Test Unit A, East Wall, 23CE240.

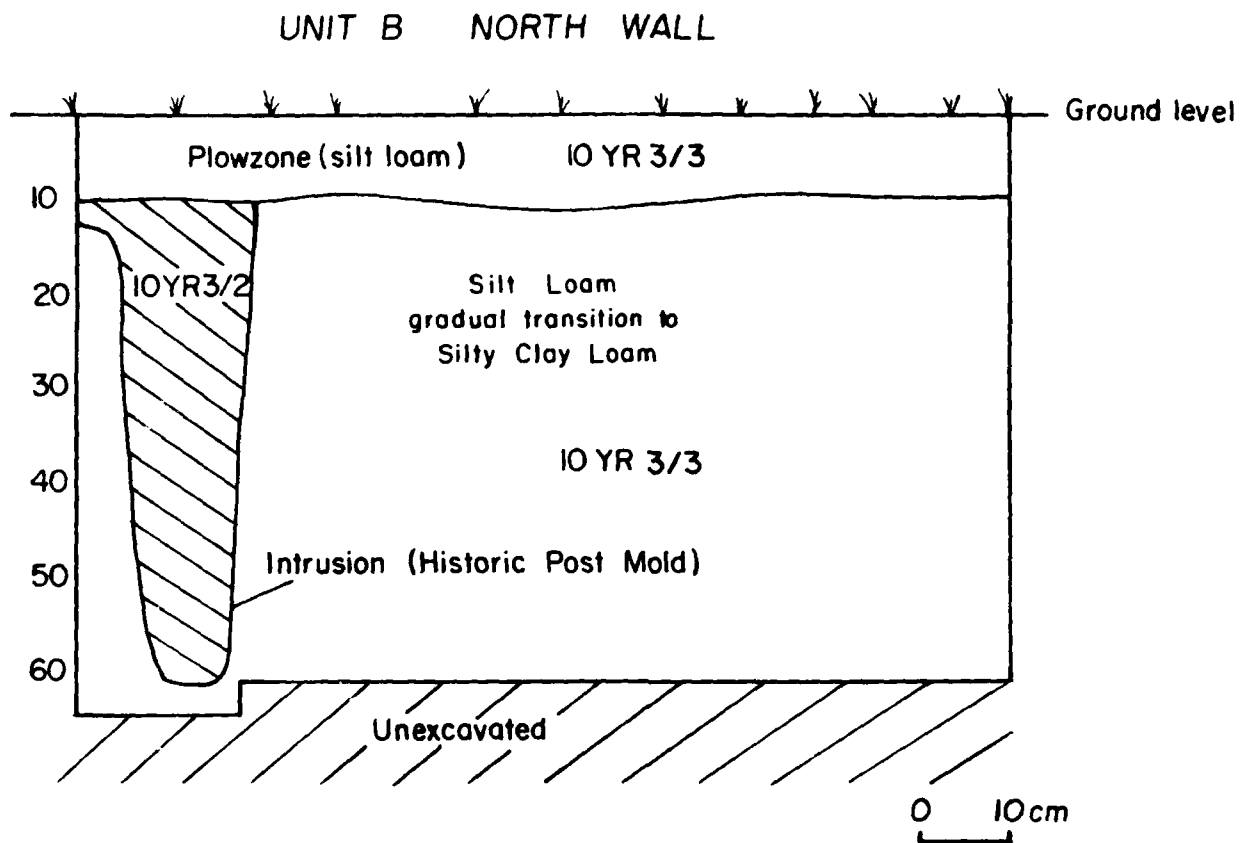


Figure 43. Profile of Test Unit B, North Wall, 23CE241.

ANALYSIS AND INTERPRETATIONS

A comparison of the results of the University of Missouri's Phase I survey investigations (Roper 1977) and the phase II testing investigations at 23CE240 and 23CE241 described in this report raises some interesting methodological and interpretive issues. There are many differences in the findings of the two studies.

1. The extent of the sites observed in the 2 studies differs. The University of Missouri survey found 23CE240 to be 7,500 m² in extent and 23CE241 to have an area of about 1,000 m². The 1982 controlled surface collection found the area of 23CE240 to be about 3,500 m² and that of 23CE241 to be about 5,000 m². Since the total area of the 2 sites is the same in both studies, it is apparent that the major difference between the interpretations of their extent is in determination of the boundary between the sites if, indeed, such a boundary actually exists.
2. More than twice as many pieces of prehistoric cultural material were found on the surface of the sites in the 1976 survey than during the 1982 study. This is especially notable because of the fact that the sites were visited only once during the 1976 survey while they were visited repeatedly in 1982. In both studies surface collections were made under excellent conditions; the sites had been plowed and disked and recently rained upon and surface visibility was 90-100%. It should also be noted that the sites were virtually invisible at the onset of the 1982 season when the recently plowed and disked field was dry. In 1976, 26 pieces of cultural material were found on the surface of 23CE240 and 76 cultural items were found at 23CE241, whereas only 8 cultural items were found on the surface of 23CE240 and 42 on 23CE241 in 1982.
3. The diversity of artifact classes from the 1976 collection is greater than the 1982 collection particularly at 23CE241 (compare Tables 28 and 29). It appears that most, if not all, of the bifaces at these sites were collected during the 1976 survey and, perhaps, at other times prior to the 1982 investigations.

In looking at these figures the importance of providing detailed information on the conditions under which surface collections are made, as Roper (1977) did for the 1976 survey, is apparent. It is evident that the 1976 and 1982 surface collections were made under very similar and nearly ideal conditions and, therefore, the samples from the 2 surveys should be comparable. Therefore, we can conclude that the 1976 surface collection was quite thorough, that it generated a representative sample of the general surface assemblage from the sites, and that it essentially exhausted the data-producing potential of the surface-plowzone units at the sites.

Table 29

Artifact Class Frequencies from 23CE240 and 23CE241

Artifact Class	23CE240	23CE241
primary element	1	-
secondary element	-	4
tertiary element ¹	9	22
biface thinning element	-	4
core	-	5
tested cobble	-	1
thick biface	-	-
thin biface	-	-
pp/hct	-	-
arrowpoint	-	-
unifacial scraper	-	-
steeply retouched uniface ²	-	4
spokeshave	-	-
graver	-	-
perforator/drill	-	-
pitted cobble	-	-
ground cobble	1	1
fire-cracked rock	1	1
Total	12	42

1 = includes angular fragments

2 = includes utilized elements

23CE240

Prehistoric

A total of 12 prehistoric cultural items was recovered from 23CE240. These items are listed in Appendix V. They consisted of only 4 artifact classes, primary and tertiary elements, a fragment of a cobble which may have been ground, and a fire-cracked sandstone fragment (Table 29). Eight surface artifacts were thinly distributed over an area of about 3,500 m² (Figure 41) and 4 artifacts were recovered from undisturbed subsurface deposits as deep as 80-90 cm below surface. There was no evidence of cultural features or preserved environmental remains, and the artifact sample is too small for an analysis of intrasite patterning. Although the artifact sample is too small to be statistically meaningful, it is apparent that a variety of chert types were used at the site and that the production of some chipped stone tools included heat treating (Table 30). Tertiary elements are the dominant class of lithic debris in the 1976 and 1982 collections (Tables 28 and 31) suggesting that advanced stages of chipped stone tool manufacture were a dominant activity during the prehistoric occupations of this location.

The surface-plowzone and subplowzone prehistoric cultural deposits at 23CE240 appear to represent a series of very ephemeral occupations of this location in the floodplain of the Sac River. The superimposed cultural deposits probably represent a sequence of these short-term occupations, but in the absence of diagnostic artifacts or absolute dates, the length of this sequence cannot be determined. The only diagnostic artifact from the site is a corner-notched point with long barbs from the 1976 surface collection which indicates that at least one of the short-term, limited activity occupations of this site took place during the Late Archaic or the Early to Middle Woodland period.

Historic

A total of 29 historic artifacts was found on the surface of 23CE240 and they are listed in Appendix VI. For the most part they consist of broken glass, and the majority were found along the field road on the south end of the site (Figure 41). There was no indication found on the Government Land Office surveyor's plat, the 1941 USGS Caplinger Mills quadrangle map, or informant interviews to indicate that there had been a farmstead or other historic occupation here, and it is probable that these recent remains simply reflect a thin scatter of early- to mid-twentieth century trash.

23CE241

Prehistoric

Forty-two cultural items representing 8 artifact classes were found scattered over an area of about 5,000 m² at 23CE241 during the 1982 survey (Table 29). The site is a low-density surface scatter; no cultural remains were found in undisturbed subsurface deposits. There was no evidence of cultural features or preserved environmental remains, and the artifact sample is too small for an analysis of intrasite patterning. The cultural

Table 30

Lithic Raw Material Utilization¹

Chert Types	23CE240 ²	23CE241
1 = white chert	9.1	24.4
2 = mottled white chert	-	4.9
3 = banded gray-white chert	18.2	19.5
4 = mottled gray-white chert	9.1	4.9
5 = white-black chert	-	-
6 = gray chert	-	9.8
7 = translucent gray and white chert	9.1	4.9
8 = mottled gray-brown chert	-	2.4
9 = gray-black chert	-	-
10 = banded blue-gray chert	-	4.9
11 = red chert	9.1	2.4
12 = pink chert (heat-treated)	18.2	12.2
13 = red-pink chert (heat-treated)	-	4.9
14 = red-yellow chert	-	-
15 = tan chert	18.2	2.4
16 = tan-black chert	-	-
17 = sandstone	9.1	2.4
18 = quartzite	-	-
N	11	41

1 = compare to Table 26 in text

2 = percentage

Table 31

Summary Characteristics of Lithic Debris¹

Debris Category	23CE240	23CE241
	³	
primary element	10.0	-
secondary element	-	11.8
tertiary element ²	90.0	64.7
biface thinning	-	11.8
core	-	14.7
N	10	34

1 = compare to Table 27

2 = includes angular fragments, excludes utilized and retouched elements

3 = percentage

remains consist mostly of lithic debris, but 4 retouched or utilized flake scrapers and a fragment of a sandstone cobble which may have been ground were found. A Scallorn point, several bifaces, and a mano were found during the 1976 survey (Table 28). A wide range of chert types including heat treated cherts, is represented; white chert and banded gray-white chert are predominant here as they are at the other sites included in this investigation (Tables 26 and 30). The sample of lithic debris is small, but it appears that a wide range of stages of tool production is represented at the site; the percentages of cores (early stage manufacture) and biface thinning elements (late stage manufacture, repair, and maintenance) are higher here than at the other sites in the project area previously described in this report (Tables 27 and 31).

Site 23CE241 is a low density site with a low to intermediate range of artifact classes. While the low artifact density indicates short term occupations, the presence of a wide range of lithic debris classes and one or more ground cobbles (probably plant processing tools) suggests habitation which included domestic activities as opposed to short term, specialized activity occupations. The site may represent one or more short term, domestic occupations by small family groups of Late Woodland people, and, undoubtedly, it was part of a much larger settlement system which probably included villages like the Flycatcher and Dryocopus sites as well as special use sites. Alternatively, the prehistoric remains at the site may represent both short term domestic and specialized activity occupations.

Historic

The only historic artifact from 23CE241 is a tine from a hay rake which represents recent agricultural activities at this location.

ASSESSMENT OF SIGNIFICANCE

The criteria of significance and procedures for assessing National Register eligibility which have been applied in this investigation are discussed in Chapter V (Research Objectives) and Chapter VIII (Significance of the Sites and National Register of Historic Places Considerations). In the cases of sites 23CE240 and 23CE241 the criterion against which their potential significance should be measured is whether or not they "have yielded, or may be likely to yield, information important in prehistory or history" (Code of Federal Regulations, 36 CFR Part 60.6) or, more to the point, "what is their potential to yield new and significant data pertinent to regional and other relevant research questions?" As noted above, the major research questions addressed in this study include: 1) location and settlement choice, 2) nature of the lithic assemblage including functional and technological considerations, and 3) intrasite patterns. These questions have been addressed in the preceding section.

23CE240 and 23CE241: Prehistoric Components

The 1982 investigations at 23CE240 and 23CE241 included controlled surface collections under ideal visibility conditions, test excavations, and incorporation of the data with information from previous investigations at the sites. This Phase II testing program has generated a very small amount

of cultural material; no cultural features, culturally relevant environmental data, or additional diagnostic artifacts were found, no intrasite patterning is evident; and the density of cultural materials is so low that efforts to recover representative samples of occupational remains from undisturbed subplowzone deposits in stratigraphic context would be prohibitively costly.

These investigations indicate that the sites are very light lithic scatters, and there is very little likelihood that further work at the sites would yield a significantly larger quantity of cultural material or any new classes of archaeological remains. The maximum data-producing potential of the sites appears to have been realized as a result of the 1976 survey and the controlled surface collections and test excavations in 1982. Relevant research questions have been addressed as a result of these investigations, and there is an extremely low probability that further study of these sites would generate significant new data to apply to these and other research questions. Therefore, the prehistoric components at sites 23CE240 and 23CE241 are assessed as ineligible for inclusion in the National Register of Historic Places.

23CE240 and 23CE241: Historic Components

The historic components at 23CE240 and 23CE241 appear to represent a low-density scatter of recent trash and an isolated find respectively. There is very little likelihood that either site will yield additional information "important in history," and the historic components at sites 23CE240 and 23CE241 are assessed as ineligible for inclusion in the National Register of Historic Places.

RECOMMENDATIONS

Since there is an extremely low probability that the sites will yield any additional data "important in prehistory or history" or otherwise qualify for inclusion in the National Register of Historic Places, it is recommended that they be determined ineligible for National Register listing, and that proposed construction activities be permitted to proceed at these locations. In the unlikely event that buried artifact concentrations and/or cultural features are exposed during construction, project activities should cease in the immediate area of the find until Corps of Engineers archaeologists have had a chance to determine the significance of the find.

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APPENDIX IV

Inventory and Provenience of Prehistoric Artifact Data

23CE240 and 23CE241

Site 23CE240

23CE240: CONTROLLED SURFACE COLLECTION (10 m² units)¹

- F-20: 1 ground cobble fragment, fire-cracked sandstone
- F-22: 1 fire-cracked sandstone fragment
- G-17: 1 tertiary element, banded gray-white chert
- H-17: 1 tertiary element, white chert
- I-16: 1 tertiary element, pink chert
- I-19: 1 tertiary element, banded gray-white chert
- I-21: 1 tertiary element, tan chert
- J-14: 1 tertiary element, pink chert

23CE240: TEST EXCAVATIONS

Test Unit A, 40-50 cm below surface

- 1 tertiary element, translucent gray-white chert
- 1 tertiary element, red chert

Test Unit A, 60-70 cm below surface

- 1 tertiary element, mottled gray-white chert

Test Unit A, 80-90 cm below surface

- 1 primary element, tan chert

¹ - The number of each 10 meter square is determined by the coordinates of the northwest corner (see Figure 41)

Site 23CE241

23CE241: GENERAL SURFACE COLLECTION

Field road on south end of site

- 1 steeply retouched uniface (biface thinning element), pink chert
- 1 tertiary element (utilized flake scraper), banded blue-gray chert
- 1 secondary element, red-pink chert
- 1 tertiary element, white chert
- 1 tertiary element, gray chert
- 1 tertiary element, pink chert

23CE241: CONTROLLED SURFACE COLLECTION (10 m² units)

- A-5: 1 tertiary element, mottled white chert
 - 1 core, mottled gray-brown chert
 - 1 angular fragment, white chert
 - 1 ground cobble fragment, sandstone
 - 1 fire-cracked sandstone fragment
- A-7: 1 biface thinning element, red-pink chert
 - 2 tertiary elements, gray chert
 - 1 angular fragment, banded gray-white chert
- A-9: 1 biface thinning element, translucent gray-white chert
 - 1 tertiary element, banded blue-gray chert
 - 1 tertiary element, red chert
 - 2 tertiary elements, pink chert
- B-7: 2 secondary elements, white chert
 - 1 tertiary element, pink chert
 - 1 core, banded gray-white chert
 - 1 angular fragment, mottled white chert
- B-8: 2 tertiary elements, banded gray-white chert
 - 1 angular fragment, mottled gray-white chert
- B-9: 1 core, white chert
 - 1 angular fragment, white chert
- B-10: 1 angular fragment, white chert
- C-3: 1 tertiary element (utilized flake scraper), banded gray-white chert
 - 1 tertiary element, banded gray-white chert
- C-5: 1 biface thinning element, translucent gray-white chert
- C-6: 1 biface thinning element, white chert
- C-9: 1 core, banded gray-white chert

Site 23CE241 (continued)

- D-6: 1 tested cobble, tan chert
- D-10: 1 core, banded gray-white chert
- D-13: 1 steeply retouched uniface (2 edges, tertiary element), white chert
- E-9: 1 tertiary element, mottled gray-white chert
- F-10: 1 secondary element, gray chert
1 tertiary element, banded gray-white chert

APPENDIX V

Inventory and Provenience of Historic Artifact Data

23CE240 and 23CE241

Site 23CE240

23CE240: CONTROLLED SURFACE COLLECTION (10 m² units)

- F-19: 1 milk glass rim
1 green glass
1 clear glass, Ball jar base
17 clear glass
- F-20: 1 clear glass
- F-22: 1 brown glass
1 green glass
- G-19: 1 sandal heel, sole and buckle
1 pop-top can tab
- H-21: 1 green glass
1 clear glass
- I-16: 1 clear glass
- I-18: 1 machinery casing, iron

Site 23CE241

23CE241: CONTROLLED SURFACE COLLECTION (10 m² units)

- B-5: 1 pick-up tine; mechanical hay rake

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